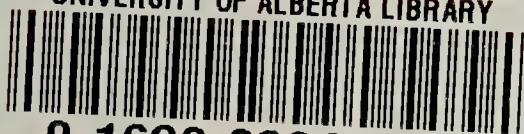


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BLUE JAY

June 1994

Blue Jay, founded in 1942 by Isabel M. Priestly, is a journal of natural history and conservation for Saskatchewan and adjacent regions. It is published quarterly by **Nature Saskatchewan, Box 4348, Regina, Saskatchewan, S4P 3W6.**

CN ISSN 0006-5099.

Editor: J. Lynn Brown

Associate Editors: Margaret Belcher, Ed Driver, J. Bernard Gollop, Wayne C. Harris, Ronald Hooper, Robert W. Nero, Carol A. Scott, Vernon L. Harms

EDITORIAL INFORMATION: All items for publication should be addressed to the editor, care of Nature Saskatchewan (see address at top). Deadlines for each issue are two months prior to issue, i.e. 1 January, 1 April, 1 July, and 1 October. Please include author's telephone number for editorial contact, if necessary. Typewritten manuscripts should be double spaced and submitted in duplicate. Manuscripts may be submitted in text file form on IBM 5.25 inch DSDD diskettes, which will be returned to authors when copies have been made. The editor uses Word Perfect 5.1 and can accept manuscripts in ASCII format also. Please include a hard copy. For further assistance see "Guidelines for Authors," *Blue Jay* 50: 126-128, or contact the editor. *Blue Jay* is abstracted by BIOSIS.

Common names are used for species where possible. Bird names follow the 1983 revision of the *American Ornithologists' Union Check-list*. Mammals are from Banfield's *The Mammals of Canada* (1974). Since insect and plant names are not standardized, scientific names are included, with authorities where deemed necessary.

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Cover: Whooping Cranes. Photo by Keith Barr.

Published by the Canadian Plains Research Center, University of Regina. Printed by Merit Printing, Regina, Saskatchewan, on 10% recycled paper.

THIS ORGANIZATION RECEIVES FUNDING FROM



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SOCIETY NOTES

PROPOSED AMENDMENTS TO THE SNHS CONSTITUTION

To: All members of the Saskatchewan
Natural History Society

From: Douglas A. Schmeiser,
President

Subject: Proposal to amend the
constitution of the Saskatchewan
Natural History Society

This issue of *Blue Jay* is intended to serve notice that at the annual general meeting in Moose Jaw on the morning of 1 October 1994, at the Wakamow Valley Centre, a proposal to amend the constitution of the Society will be considered. All members are invited to attend. At 30 April 1994 meeting, the Board of Directors adopted the following resolution:

WHEREAS the Saskatchewan Natural History Society wishes to amend its constitution to provide a more flexible schedule and method for notifying its members with respect to notification of changes to its constitution;

THEREFORE, BE IT RESOLVED
THAT Article 4 (section 1), second

sentence, be amended to read, "Notice of each such annual meeting shall be published in either the *Blue Jay, Newsletter* or in a special mailing between 15 to 50 days before the meeting date."

THEREFORE, BE IT RESOLVED
THAT Article 4 (section 5) be amended to read, "At the written request of any 20 members of the Society, the President shall call a special general meeting in either the *Blue Jay, Newsletter* or in a special mailing."

THEREFORE, BE IT RESOLVED
THAT Article 10 (section 1), second sentence, be amended to read, "Notice of any such amendments and clear statement of its purpose must be given in either the *Blue Jay, Newsletter* or in a special mailing between 15 and 50 days before the annual or special general meeting."

The Board of Director's recommendation: Vote "FOR" the proposed amendment.

DESTINATION: ARANSAS NATIONAL WILDLIFE REFUGE, TEXAS, JANUARY 1993

GILLIAN RICHARDSON, 2450 Crowe Bay, Regina, Saskatchewan. S4V 0V7

Looking for a winter birding destination, not too far, not too costly? Try southern Texas — not so hot you will suffer meteorological shock going from -35° to $+35^{\circ}$, but mild enough for a light sweater or wind-breaker, and humid enough to give you a refreshing break from the cold, dry effects of a prairie winter. Added bonus — great birding!

Among other birding spots in the area, Aransas National Wildlife Refuge on the Gulf Coast boasts a possible count of over 350 species during the winter season due to its strategic location directly in the path of the central flyway, and to the variety of habitats on the refuge including salt marsh, grassland and oak woods. Of primary interest to many visitors is the Whooping Crane, as this is the winter destination of the Wood Buffalo flock. Thirty-seven species of mammals also make their homes there.

Comprising almost 55,000 acres, Aransas was established in 1937 to protect vanishing species of the coastal area. Upon approach from the south, via the town of Rockport, it seems an unlikely spot for a refuge. The coast from Corpus Christi north

to Galveston area is littered with unsightly oil and gas refineries and petrochemical plants, ship-building facilities, small urban areas and the inevitable road construction. Low, agricultural land makes up the remaining landscape and, before we actually entered the refuge, we sighted meadowlarks and numerous hawks. Large flocks of Snow and Blue Geese feed in the ploughed fields. Both Turkey and Black Vultures take advantage of meals found in roadside ditches. Wherever there are marshy spots Great Blue Herons, Great Egrets and Snowy Egrets hunt.

The morning was foggy, but the mist kept shifting as my husband and I wove our way along the route which borders sections of farmland. After close to an hour's drive from Corpus Christi (with several impromptu stops to raise binoculars in response to "What was that?") we entered a wooded area and approached the refuge entry gate. Hold it — wild turkeys, two of them, foraging alongside the road, almost at arm's length. A good omen, perhaps? It was Christmas season, after all!

First, a visit to the headquarters

building near the gate. Although there is no entry fee, visitors are requested to sign in. The headquarters has a walk-through display of small dioramas showing various habitats and the wildlife you are likely to see. A good selection of books is available for purchase, and birding lists are provided free. A chart showing current Whooping Crane activity is located just inside the door. For the 1992-93 winter, 135 cranes had arrived at the refuge, out of an expected total of 145. Fifteen young cranes had completed migration from Canada.

Where could we see the cranes? Hopes diminished when the response was, "There is only one pair visible from within the refuge itself." Others could be sighted from the tour boats out of Rockport (more about that later). The single pair might be in one of two locations, at the end of a hiking trail nearby, or from the observation tower further into the refuge. A setback! After travelling so many miles, with fog threatening to obscure our vision, how would we locate only two white birds in 55,000 acres?

Undaunted, we set off along the Heron Flats Trail which led us from the roadside parking lot into thickets of oak and redbay towards the shoreline. Our first encounter — pairs of cardinals in their red finery. Other songbirds and flycatchers eluded identification (we are amateurs yet!) in their unfamiliar winter plumage, but there were many. The path twisted through brush, emerged from time to time along a line of sand dunes and at one point detoured to an observation platform. Geese and waders were visible along the tidal marshes, but no whoopers. The trail eventually flattened out to follow a straight track between permanently

water-filled ditches and dunes. There be dragons! American Alligators — one of six endangered species sheltered in the refuge — floated like so many logs with bulging eyes. We completed the trail in about 40 minutes, still whooper-less. Only one chance left — the observation tower, and a change in the weather!

Passing a picnic area, our attention was diverted by the sight of a javelina or wild pig scrounging for leftovers. It trotted off, grunting, unwilling to pose for a photograph. Across the road, a short trail led to the water's edge where old pilings were now used as heron perches. Three species in one binocular frame! The Little Blue and Tri-Colored Herons were new for me, a Great Blue made up the trio. Wading close to shore was a Long-billed Curlew. Again the mist closed down, and we moved on in search of whoopers.

The observation tower stands about four stories high. It is wheelchair accessible via sloping ramps. Scopes are set up on the tower for visitors to use. The view from the top was worth the whole trip — tidal marshes, Mustang Lake open at both ends to the bay, and best of all, the elusive Whooping Cranes! The fog had conveniently lifted to reveal a pair feeding in the shallows along with hundreds of ducks, geese and shorebirds.

The Whooping Cranes of Aransas have carefully defended territories along the shoreline. Only this one pair occupied the area within sight of the tower. We watched them feeding, stretching their wings and walking along the edge of the marsh.

It was hard to tear ourselves away. Only two cranes! We had plans to

take the boat tour, if the weather cooperated, but that was not a certainty. Once down from the tower, the cranes were not visible. We walked a nearby boardwalk trail to check out the birds feeding along the shoreline — more waders, but none to add to our list. The Big Tree Trail was handy and took only a few minutes. The woods were thick, but quiet and we were not even bothered by the mosquitoes we'd been warned to expect.

The rest of the road through the refuge is a driving route. It took us about 45 minutes and produced two completely indifferent armadillos snuffling in the ditch, a coyote heading across country, several more javelinas and a White-tailed Deer. No sign of the Bobcats or Cougars that inhabit the area, although I overheard a visitor at the centre say he'd seen a Bobcat the week before. Hawks and vultures were seen frequently.

The refuge is open during daylight hours. We left in late afternoon to return to our motel in Corpus Christi. Later, we discovered better and more convenient lodging in Rockport which we used the following night, after the boat tour.

The tour boat, *Pisces*, operated by Captain John Howell, did turn out to be the best way to see Whooping Cranes. The weather cleared for us to take the 4-hour trip (\$18 US each) the next afternoon. *Pisces* is based in Rockport, a fishing harbour, and travels to the refuge along part of the Intercoastal Canal, a link in the route you could follow from the Great Lakes to South America. It is used by commercial shipping, including the barges loaded with hazardous materials which passed our 58-foot tour boat almost at arm's length.

Whooping Cranes have certainly picked a fragile habitat for their winter quarters.

Our tour guide entertained us during the hour-long ride to the refuge area with information about the ship canal, the history of the local coastal area and interesting facts about the cranes which are a major tourist attraction. We passed sand bars occupied by Double-crested and Olivaceous Cormorants. A pair of American Oystercatchers were distant, but visible and new to my list. Several species of gulls and terns wheeled and dived over our wake. Once into the sheltered bay of the refuge, the boat was "grounded" in the sandy shallows and the engine cut so we could enjoy a close up look at the cranes.

They were easily visible without binoculars, but with the glasses it was possible to see the colours of their leg bands. Our guide explained how each pair returned to the same part of the refuge each winter, sometimes with their young. The sub-adult groups moved within these territories until they paired off and attempted to secure an area of their own. We saw several pairs, family groups with a juvenile, and other groups of eight or more sub-adults. Our total count, including the pair seen from the tower, was 28. We were treated to a brief display of dancing by one pair.

The boat tour also provided us with delicate pink Roseate Spoonbills, a large flock of American Avocets in their smart grey winter garb, and a close look at a Peregrine Falcon resting on a channel marker.

Aransas seems to have a precarious existence. Shielded from the weather off the Gulf of Mexico only by a narrow string of low islands,

hemmed in by industry with the potential for untold damage from pollution, nevertheless thousands of birds depend on it for a winter base with its rich feeding grounds and mild climate. While the local people consider the birds "theirs," we saw many of "our" familiar species in a fascinating new setting. We envied them the

opportunity to stay behind, while we turned our faces north once again to winter. I wonder if that Whooping Crane with the double yellow bands will be the one I eventually get to see somewhere in Saskatchewan?

A list of species we sighted follows:

Common Loon	Northern Shoveler	Willet
Pied-billed Grebe	Ring-necked Duck	Greater Yellowlegs
Brown Pelican	Redhead	American Avocet
White Pelican	Red-breasted	Bonaparte's Gull
Double-crested	Merganser	Herring Gull
Cormorant	Turkey Vulture	Laughing Gull
Olivaceous Cormorant	Black Vulture	Ring-billed Gull
Great Blue Heron	Red-tailed Hawk	Forster's Tern
Little Blue Heron	White-tailed Hawk	Common Tern
Tri-colored Heron	Northern Harrier	Royal Tern
Great Egret	American Kestrel	Mourning Dove
Snowy Egret	Peregrine Falcon	Belted Kingfisher
Roseate Spoonbill	Wild Turkey	Brown Thrasher
Canada Goose	Whooping Crane	American Robin
Snow (Blue) Goose	Sandhill Crane	Loggerhead Shrike
Black-bellied Whistling	Common Moorhen	Yellow-rumped
Duck	American Oyster-	Warbler
Black Duck	catcher	Eastern (?)
Mottled Duck	Ruddy Turnstone	Meadowlark
American Wigeon	Long-billed Curlew	Boat-tailed Grackle
Northern Pintail	Spotted Sandpiper	Northern Cardinal

Ed. note: We encourage others to write about good birding holidays they have had.



May is the transition month, and exists to connect April and June, the root with the flower. *John Burroughs. 1895. Wake Robin. Houghton Mifflin, Boston.*

NATURE'S FURY

DAISY D. MEYERS, Box 218, Leader, Saskatchewan. SON 1H0

The violent wind and rain storm in the late evening of 29 July 1993 covered a large area from Leader and Prelate in the south to the Tramping Lake-Kerrobert region in central Saskatchewan. Pictured is a large Manitoba Maple tree 62 in. in circumference and over 30 ft. long. It was one of the many trees and

bushes uprooted or damaged on Meyer's ranch at Leader. No loss of animal or bird life was observed locally although any bird nests, eggs or nestlings would be unlikely to survive the storm. Loss of suitable habitat may have an impact on tree nesting birds in 1994.



Manitoba Maple uprooted on Meyers ranch by the storm of 29 July 1993.

Daisy D. Meyers

PUZZLES OF THE PAST

The way we were and the way we are going

TIM T. TOKARYK, Royal Saskatchewan Museum, Wascana Park, Regina, Saskatchewan. S4P 3V7

I have had the good fortune to discover and work on a few fossils that have received some attention from the media. Many people, including scientists, shy away from this attention and personally I could do without acting as the fossils' interpreter. Yet I feel strongly that public attention is useful for the museum scientist and feel obligated to work with the media. In the museum's ongoing activity any publicity says, at least, that this institution is not a static place. Still, in this era of "dinomania" I can not help but wonder if scientists, more specifically paleontologists, have failed in education of the public. Case in point — the most often asked question from the media I have experienced is "So, what does this new discovery mean to Joe Public?" This question not only reflects the ignorance of the public about why we do what we do, but ultimately the lack of concern scientists show towards the public in regards to education.

To fully appreciate any answer I may give, some understanding of the history of the science is required, even if it is brief. You will note in the following paragraphs that I give fossils, paleontology, and evolution the same general meaning. Evolution,

like many other sciences, is dependent or proportionally enhanced by paleontology, which in turn is solely responsible for interpreting the fossils. The growth of evolutionary thinking follows this same pathway to a certain degree [I am not a great believer in linear thinking; life and history are too complex, but at least in this case it will do].

Historically, paleontology emerged from gentlemanly inquiry to stand on its own as an actual scientific adventure. Prior to Charles Lyell and his contemporaries in the 19th century, when scientists' work covered many disciplines, fossils held a more questionable status. It was first thought that fossils were "sports of nature," abnormalities produced in the rocks naturally. Nicholas Steno (1638-1687) thought differently. In Florence, he dissected the head of a large shark recently caught. He found great similarity between the teeth of modern sharks and those "tongue stones" of the past — teeth found in sedimentary rocks. Through a combination of biological and geological reasoning Steno convincingly suggested that the fossils were organic remains of the past and not inorganic "sports."

This suggestion was taken further by a contemporary of Steno, Robert Hooke (1635-1703). The idea of extinction of a species in the non-biblical sense was new. As Sir Charles Lyell pointed out in his *Principles of Geology* (three volumes published between 1830-1833) "In some parts of his writings ... [Hooke] leans to the opinion that species had been lost ... that there might be some connection between the disappearance of certain kinds of animals and plants and changes wrought by earthquakes in former ages" (p. 32).⁴ The important point here is that Hooke thought that extinction of certain species was caused by earthly events and not by a global catastrophe of heavenly causes like the biblical flood. Suspicious of naturalists' parochial knowledge of things that swim, crawl, walk and fly, Hooke gave strength to the belief that more examples of nature were needed.

There is a quote of Hooke that Lyell recounts that deserves repeating: "However a trivial thing a rotten [*sic*] shell may appear to some, yet these monuments of nature are more certain tokens of antiquity than coins or medals, since the best of those can be counterfeited or made by art and design ... and though it must be granted that it is very difficult to read them (the records of the past) and to raise a chronology out of them, and to state the intervals of the time wherein such or such catastrophes and mutations have happened, yet it is not impossible" (p. 32).⁴ Hooke signals that there are many questions yet to be posed as well as possible answers.

Evolution was in the air in the early and mid-19th century, before Darwin. Yet the proposed mechanisms of the process were unconvincing to all concerned. The Frenchman Jean-Baptiste Lamarck (1744-1829)

received some attention for attempting to popularize the idea of enhancement or atrophy of organs by means of use or disuse — the famous example of the giraffe stretching its neck further to obtain more food. During Lamark's time Darwin's grandfather Erasmus (1731-1802) even had some rudimentary concepts of evolution. Adrian Desmond has written an exhaustive account of pre-*Origin of Species* thinking with respect to the social atmosphere in *Politics of Evolution*.¹ During the 1820s and 1830s "all sorts of dissident knowledge flourished: not only varieties of evolution, but a swirling vortex of alternative economics, social, and biological sciences that threatened to wash away the pillars of the establishment edifice. Unlike the gentlemen's polished, expensive treatises, these sciences were spread through radical medical newspapers and inflammatory penny prints" (p. 4).¹ Radical thinking was the bed in which evolution was conceived and eventually received. The culmination of this thinking brought fossils out from the depths of ignorance to eventually support a tangible proposal that sheds some light on our existence and our surroundings and how it all came to be. And through the pages of magazines and newspapers the public was well informed.

The story doesn't end there. David Lull compiled several critical reviews of Darwin's book at the time of its publication.³ By examining this collection it isn't hard to see that "Evolutionary theory seems capable of offending almost everyone" (p. 7).³ Many of these original critiques were published in technical journals yet some were published for all to see in the more popular press of their time: William Hopkins published his review in *Fraser's Magazine*; Louis Agassiz

in *The Atlantic Monthly*; Henry Fawcett in *Macmillan's Magazine*; Adam Sedgwick in *The Spectator*; and Joseph Hooker in *Gardener's Chronicle*. The public knew at least that something was up.

Eventually most opposition was quelled by further exploration for fossils and additional development of evolutionary theory, but it was a rough road. Fossils were a particular concern for Darwin because of the missing gaps in the record. Two years after the publication of *Origin of Species* some of Darwin's fears were lessened as the lithographic limestone in Germany yielded the oldest bird skeleton known — *Archaeopteryx*. What made this bird so spectacular was that it had characteristics of its reptilian ancestry, most obviously a tail and teeth. It was a missing link of sorts and future discoveries of fossils were held as evidence for Darwinian evolution.

For the most part this parleying of information by paleontologists to the public diminished around the turn of the century. The one notable exception was in popularizing the evolutionary history of *Homo sapiens*. The impact of Darwin's thesis ultimately shook (and in some quarters still does) the vanity of our species. Any new discovery of a proto-human still rings the bell for media editors. For the rest of the paleontological community, those of us who work on lesser players in the evolutionary field make less of an impact unless the new discovery is of some unheard-of titan.

In 1911, W.D. Matthew (1870-1930), then curator at the American Museum of Natural History in New York, viewed paleontology in the modern museum (which was relatively a recent development in North

America) as "documents ... [showing the] larger history which traces the orderly development of life through vast periods of geological time."⁵ Museums became the medium through which scientists could translate their ideas to the public but at the same time the paleontologists became invisible, or at least had the option of hiding behind the displays. In 1910, W.J. Sinclair of Princeton University saw paleontology resolving lesser questions related to the science like stratigraphy.⁶

The direction of paleontology is still unfolding. Today, paleontology as a whole owes a lot to the extinction of dinosaurs (like it or not) if for only resurrecting the stony skeletons and putting their names back in the news. The cause of this resurrection has not been due to mere rediscovery of dinosaurs and paleontology by the public, but because new ideas, supported by some physical evidence reveal a dramatic, more realistic story: the intelligent carnosaur hunting down its prey, the protective mother dinosaur feeding her young. Visually this is translated in books, magazines, movies and museums. Funding for exhibits — either revamped or newly developed — has grown at an enormous rate in North America over the past two decades. Almost every major museum has changed somewhat to accommodate the public's new interest. The popularity reached its zenith with Steven Spielberg's *Jurassic Park*. Yet, conversely, paleontology as a science is barely keeping its head above water or in some cases is slowly drowning.

The problem is this: the idea that research has to yield a real, tangible and commercial gain is sentencing the historical sciences like paleontology to the basement (in some

institutions it's the boiler room in the basement). Princeton (which played a major role in the early development of paleontology in North America) axed its vertebrate paleontology program in the mid-1980s, its collections given to Yale. Museums like the ones in San Diego and London cut the support for paleontology drastically. Museum administrators, seeing the commercial excitement over what's vogue (like dinosaurs) have developed a new philosophy. Some call it the Disneyland approach to museums which in essence means spend less on research (which in many cases not only cuts operating budgets but staff as well) and hand over the museum's directional reins to exhibits. The scientists are trying to secure some ground but the power is usually not in their hands.

Stephen Gould had this warning for us when he reviewed the book and movie *Jurassic Park*.² The pursuit of commercial gain or at least sustenance from commercial gain like those incorporated in theme parks (which have little if any regard to education) "will swallow museums if educators try to copy the norms of business for immediate financial gain" (p. 56).² Short-term gains in the evolutionary sense and the economic sense often lead to extinction.

Why do we still collect fossils? There are still many evolutionary questions that we have only tentative or obscure answers for — extinction, both global and regional throughout the geological column and evolution of major taxonomic groups as well as specific groups. Fossils that surprise us by turning up in places and geological strata previously never thought probable, and the continuing reconstruction of paleoenvironments have and will continue to shape our ideas about current and future bio-

tas. To answer the reporter's question "What does this new discovery mean to Joe Public?" — in the spirit I believe the question is intended, my reply is, "Nothing." The paleontologist has no direct impact on the many social or economic ills we endure today. The paleontologist is a story teller and the book he or she uses is incomplete, missing a few chapters, some pages, many paragraphs and sentences. Yet, each year we spend what little funds are available to us to scour the valleys, hillsides and mountains to fill in some of the gaps. If we were to read the book of the earth without the past, some 4.5 billion years, there would be no meaning to it. A true perspective of today and tomorrow includes examining yesterday.

Our attitudes towards science and the men and women who are fortunate to perform such often uncelebrated tasks are continually changing. Today it is expected that financial rewards are the gauges of scientific success. If this perception were cemented entirely into the philosophy of scientific pursuit the historical sciences like paleontology would shrivel up and die. Yet there is something about paleontology that attracted me and I suppose many others to this field — simple curiosity. It is the same ethereal curiosity that I see in the eyes of school children who want to know what was the biggest dinosaur or how mean was *Tyrannosaurus rex*. It is often a child's first exploration into science. Unfortunately, paleontology like many other sciences is involuntarily tied up in the straitjacket of project objectives, financial gain and all of the other trappings of today. To try and gain some perspective on the simple questions that we and our ancestors have asked — where do we come from and why? — is in my eyes a very noble and worthwhile

pursuit that needs no hardened, black or white answer or justification. It would be a sad loss if paleontology went the way of the dinosaur.

1. DESMOND, A. 1989. The Politics of evolution. University of Chicago Press, Chicago. 503 pp.
2. GOULD, S.J. 1993. Dinomania. *The New York Review of Books* 40 (14):51-56.
3. LULL, D.L. 1973. Darwin and his critics. University of Chicago Press, Chicago. 473 pp.
4. LYELL, C. 1990. Principles of geology, volume 1, (first published in 1830 by John Murray, London). University of Chicago Press, Chicago. 511 pp.
5. MATTHEW, W.D. 1911. Fossil vertebrates — what they teach. *American Museum Journal* 11:246-247.
6. SINCLAIR, W.J. 1910. Interdependence of stratigraphy and paleontology. *Popular Science Monthly* June: 589-591.



Sandstone outcrops near Climax, Saskatchewan

Fred Lahrman

BUTTERFLIES OF THE PEACE RIVER REGION OF ALBERTA AND BRITISH COLUMBIA

NORBERT G. KONDLA, British Columbia Forest Service, Box 672, McBride, British Columbia, V0J 6E0, EDWARD M. PIKE, Department of Biological Sciences, University of Calgary, Calgary, Alberta, T2N 1N4, and FELIX A. H. SPERLING, Department of Biology, University of Ottawa, Ottawa, Ontario. K1N 6N5

Introduction Although the Peace River valley and surrounding area were explored early in Alberta's history and have been settled since the early 1900s, little has been published regarding its insect fauna.^{13,20} Works describing various aspects of the natural history of the Peace River valley include Spalding with a general synthesis, Moss on plants, and Soper on mammals and birds.^{25,26,36,37,38}

With respect to butterflies, Llewellyn-Jones lists 12 species from the Peace River district of British Columbia, and Bowman mentions six species from the Peace River district of Alberta.^{1,21} Case and Bird discuss the Peace River valley as part of a larger study area and list 32 species collected along the Peace River valley of Alberta.³ Ferris reports distribution records for various *Colias* species in the study area.^{8,9,10,11} Other miscellaneous butterfly records have been reported in the *News of the Lepidopterists' Society*.^{31,32,33,34,35,41,42,43,44}

Pike conducted extensive surveys while resident in Fairview from 1979

to 1986 and was the first to find many of the interesting butterfly taxa resident in this area. Sperling explored the region while conducting research on the genus *Papilio* from 1980 to 1986. Kondla conducted extensive surveys over eight years from 1979 to 1992. We also include records provided by K. Avery, C. Schmidt, C. Guppy, G.J. Hilchie, J. Pelham, A.W. Rupp and J. Shepard. The primary purpose of this paper is to report on the results of this increased activity since 1979.

The study area we deal with herein consists of the Peace River valley from Bullhead Mountain/ Dunlevy area west of Hudson Hope, British Columbia, to Fort Vermilion, Alberta; low elevation streams tributary to the Peace River; nearby areas which historically contained aspen parkland and grasslands;^{25,26} most lands within 30 km of the Peace River; and a few other areas of low elevation poplar forest. Not included are Butler Ridge, British Columbia; and Mount Watt and Caribou Mountains in Alberta even though they are very close to the Peace River valley. They



Fifth instar (Papilio Zelicaon) from Dixonville, Alberta.

Felix Sperling

are excluded because they support distinctly different habitats and fauna in comparison with the remainder of the study area.

Specific study sites are listed in Table 1 and geographically displayed in Figure 1. Over 96 sites were visited and more than 6400 specimens were collected and identified in the course of researching this region since 1979. Specimens of rare or doubtful taxa collected before 1979 have been examined and identifications checked. Specimens are in the personal collections of the authors, with some voucher specimens deposited in the Strickland Museum, Department of Entomology, at the University of Alberta, Edmonton.

Butterfly nomenclature has been both fluid and controversial in recent years. Consequently there is no sin-

gle source that represents the consensus of butterfly students. Zoological names at the genus level follow Scott and we have taken species and subspecies names from a variety of published and unpublished contemporary sources.²⁹ Our use of common names is reasonably consistent with Miller.²³

Annotated List

Hesperiidae

Northern Cloudy Wing *Thorybes pylades* Scudder

LOCALITIES: 1c, 1e, 1f, 2a, 3h, 4b, 4j, 5d, 5i, 5j, 6g, 7b, 7i, 8d, 8e, 8i, 8j
Flight dates: 18 May to 12 July

Dreamy Dusky Wing *Erynnis icelus* (Scudder and Burgess)

LOCALITIES: 1c, 1e, 1i, 2a, 2h, 2j, 3e, 3g, 5d, 5e, 5i, 5u, 8d, 8e, 8i
FLIGHT DATES: 4 May to 21 June



Beatton River valley northeast of Fort St. John, B.C.

N. Kondla

Persius Dusky Wing *Erynnis persius* (Scudder)

LOCALITIES: 1e, 1h, 1l, 2h, 3e, 4d, 8d, 8g, 8i

FLIGHT DATES: 16 May to 21 June

Grizzled Skipper *Pyrgus centaureae freija* (Warren)

LOCALITIES: 2j

FLIGHT DATES: 3 June

NOTES: This denizen of open black spruce bogs has only been found once in the study area, a few miles west of Goodlow, BC.

Checkered Skipper *Pyrgus communis* (Grote)

LOCALITIES: 3g, 5f, 5h, 5i, 5j, 6g

FLIGHT DATES: 17 May to 25 August 25

NOTES: Adults of this species fly over the dry grasslands along the river valley, often visiting flowers of alfalfa which are used as nectar

sources and as perching sites for males. The flight period is very long but it is unclear if this represents multiple broods or a staggered emergence. Previously, this taxon was known to occur as far north as Fort MacMurray and as far west as Edmonton.

Arctic Skipper *Carterocephalus palaemon mandan* (W.H. Edwards)

LOCALITIES: 1k, 2h, 2j, 3a, 3g, 4k, 5d, 5h, 5i, 5j, 5q, 5u, 5w, 8e, 8i

FLIGHT DATES: 16 May to 26 June

NOTES: Case and Bird indicate that, in their larger study, there is a great deal of variation within this species.³ Kondla listed the main differences between mandan and the unnamed mountain subspecies in Alberta.¹⁶

We have found in the Peace River region that there is little phenotypic variation. All specimens collected are small and light in colour.

Garita Skipperling *Oarisma garita* (Reakirt)

LOCALITIES: 1c, 1e, 1f, 1k, 1l, 2a, 3h, 4e, 4k, 5d, 5f, 5h, 5i, 5j, 5u, 6f, 6g

FLIGHT DATES: 31 May to 3 July

NOTES: Populations of this species appear to be largely confined to native grasslands, primarily along the Peace River valley and tributary stream valleys. They have not been collected in old fields or along highways or road sides any distance from native grassland. Adults differ from those collected in other areas of Alberta in that the dark areas of the ventral hind wing are greatly extended and much darker in specimens from the Peace River valley. Based on material collected, this taxon may warrant description as a distinct subspecies.

Assiniboia Skipper *Hesperia assiniboia* (Lyman)

LOCALITIES: 1e, 1f, 2a, 2d, 3h, 4e, 5d, 5h, 5i, 5j, 5k, 5u, 5w, 6c, 6g

FLIGHT DATES: 4 August to 26 August

NOTES: Adults of this taxon are locally abundant on the grassy slopes of the Peace River valley, where they frequent flowers of alfalfa and *Aster* sp. The distinctive Peace River populations are assigned to this species due to their very light coloration, but they show consistent phenotypic differences from specimens of this species collected in southern Alberta. These differences include a strong tendency towards loss of silverying on the ventral surface, and a reduction of the orange colouring on the dorsal surface. The collection of *H. assiniboia* in the Peace River area is a range extension of about 550 km, from Redwater, Alberta.¹⁵

Long Dash *Polites mystic dacotah* (W.H. Edwards)

LOCALITIES: 1b, 2c, 3a, 4h, 5d, 5h, 5j, 7i, 8i

FLIGHT DATES: 19 June to 14 August

NOTES: Case and Bird report this taxon under the name *P. sonora dacotah*.³ On 14 June 1981, two fresh specimens were collected at Dunvegan. Both individuals were puddling at alkali seepages at the base of a steep grassy slope locally known as Dunvegan Hill. In 1983 specimens appeared to be more abundant, and were seen or collected along margins of aspen forests.

Roadside Skipper *Amblyscirtes vialis* (W.H. Edwards)

LOCALITIES: 4j, 5d, 5i, 5j, 6g, 7b, 7i, 8d, 8i

FLIGHT DATES: 20 May to 23 June

NOTES: This species has not yet been found in the portion of the study area in British Columbia.

Papilionidae

Old World Swallowtail *Papilio machaon pikei* Sperling

LOCALITIES: 1a*, 1c*, 1e*, 1f*, 2a*, 5f*, 5g*, 5h*, 5j*, 6f*, 6g*, 7b*, 7i (asterisks indicate larval records)

FLIGHT DATES: 30 May to 14 July

NOTES: This race of *Papilio machaon* is endemic to the eroding valley sides and badlands of the Peace River area. It was originally reported by Llewellyn-Jones as *P. machaon oregonius*; and by Case and Bird, and Case and Case as *P. machaon hudsonianus*.^{3,4,21} Sperling described it as a patronym of Edward M. Pike.³⁷ *P. m. pikei* is intermediate among *P. m. hudsonianus*, *P. m. aliaska* and *P. m. oregonius* in wing shape and colour markings, and is best separated by habitat and locality.

Populations can be found wherever

dense patches of its larval host plant, linear-leaved wormwood (*Artemisia dracunculus*), can be found. Small larvae have been found as early as July 8, and all instars have been found in August.⁴⁰ Larvae collected in early September had a high rate of parasitism by large black ichneumon wasps (*Trogus* sp.). Adults nectar at alfalfa (*Medicago sativa*). Males are easily found while they patrol for females along the upper edge of prominent, south-facing valley slopes or sometimes also at host plant patches at the base of grassy slopes.

Zelicaon Swallowtail *Papilio zelicaon* Lucas

LOCALITIES: 1a*, 1d*, 1e, 1g*, 1l, 2h, 3a*, 3b*, 3e, 3f*, 3g, 4a*, 4c*, 4g*, 4h*, 4i*, 5f, 6a*, 6g, 7k, 7m* (asterisks indicate larval records)

FLIGHT DATES: 17 May to 9 July

NOTES: Larvae of all instars can be found throughout July. Adults have been reared from larvae collected on cow parsnip (*Heracleum lanatum*), heart-leaved Alexanders (*Zizia aptera*) and water parsnip (*Sium suave*). *P. zelicaon* generally flies in mixed forest and parkland. *P. zelicaon* and *P. machaon* adults have been collected together at several localities along the high, grassy slopes of the Peace River valley and a small number of hybrids have been collected.³⁹

Canadian Swallowtail *Papilio canadensis* Rothschild and Jordan

LOCALITIES: 1c, 1e, 1f, 1h, 1i, 1l, 1k, 1j, 2a, 2e, 2h, 3a, 3b, 3d, 3e, 3g, 4b, 4e, 4k, 5d, 5f, 5g, 5h, 5i, 5j, 5k, 5u, 5w, 6e, 6f, 6g, 7a, 7c, 7d, 7i, 7k, 7n, 8c, 8d, 8e, 8g, 8h, 8i

FLIGHT DATES: 15 May to 14 July

NOTES: This species seems to be generally distributed throughout the study area. Adults are found in all habitats. An adult was reared from

an egg that was observed being oviposited on a small aspen poplar leaf about one metre above the ground at La Crete ferry. Traditionally reported in the literature as a subspecies of *Papilio glaucus* but recently the taxon *canadensis* has been shown to be a distinct species.¹²

Pieridae

Western Checkered White *Pieris occidentalis* Reakirt

LOCALITIES: 1c, 1e, 1f, 1k, 2a, 3e, 3g, 3h, 4e, 4k, 5f, 5g, 5i, 5j, 5r, 5u, 5z, 6g, 7a, 7b, 7c, 7i, 7k, 8i, 8g

FLIGHT DATES: 4 April to 8 September

NOTES: This species was listed under the name *P. protodice occidentalis*.³ It is here treated as a separate species in accordance with accepted classification.^{14,24} There are at least two broods. Early spring brood individuals are smaller and more heavily marked with dark scales on the ventral hind wing than butterflies of the summer brood which are larger and lighter.

Mustard White *Pieris napi oleracea* Harris

LOCALITIES: 3g, 5d, 5e, 5i, 5q, 5u, 7i, 8a, 8g, 8h, 8i

COLLECTION DATES: 3 May to 26 July

Cabbage Butterfly *Pieris rapae* (Linnaeus)

LOCALITIES: 1e, 1f, 1k, 1n, 2a, 2f, 2j, 3e, 3g, 3h, 4d, 4e, 4k, 5d, 5f, 5h, 5i, 5j, 5k, 5u, 5w, 6b, 6g, 7a, 7b, 7c, 7e, 7f, 7i, 8c, 8e

FLIGHT DATES: 27 April to 29 September

NOTES: This introduced species is generally distributed throughout the Peace River valley. Adults can be

very abundant, frequently visiting flowers of alfalfa in August, and larvae are considered pests of market garden crops. There are at least two broods, and perhaps as many as four.

Large Marble *Euchloe ausonides*
Lucas

LOCALITIES: 1c, 1i, 2a, 2c, 2e, 2h, 3e, 3g, 4e, 5d, 5f, 5h, 5i, 5y, 6f, 7a, 7b, 7c, 7g, 7i, 8c, 8g, 8h

FLIGHT DATES: 16 May to 9 August

NOTES: In June, if a large number of white butterflies is seen flying over an unploughed field in the Fairview area, it is certain that they are adults of this species, and not *P. rapae*. In some fields the adults are very abundant. Adults are also found in jack-pine sandhills, aspen forests, and grasslands along the Peace River. Eggs are laid on budding inflorescences of *Arabis drummondii* Gray, one egg to a plant.

Creusa Marble *Euchloe creusa*
(Doubleday)

LOCALITIES: 1h

COLLECTION DATES: 26 June

NOTES: So far only found in the Dunlevy area where the Peace River enters the Rocky Mountains.

Clouded Sulphur *Colias philodice*
Godart

LOCALITIES: 1c, 1e, 1f, 1j, 1k, 1l, 1n, 2a, 2e, 2h, 3a, 3b, 3e, 3g, 4e, 4k, 5d, 5f, 5h, 5i, 5j, 5k, 5u, 5y, 6g, 7d, 7i, 7m, 8e, 8g, 8i

FLIGHT DATES: 4 May to 29 September

NOTES: This species appears to have a small spring brood, at least two summer broods and sometimes a fall brood in the Peace country. Specimens of this species were reported as *C. eurytheme*.³

Christina Sulphur *Colias christina*
Edwards

LOCALITIES: 1e, 1h, 1m, 2a, 2e, 2f, 2h, 2j, 3a, 4b, 4c, 5d, 5h, 5y, 7a, 7e, 7k, 7m, 8i

FLIGHT DATES: 21 June to 12 August

NOTES: Specimens of this species were misidentified as *C. eurytheme*.³

The taxon *alberta*, described from the study area by Bowman as a subspecies of *eurytheme*, has been the subject of some debate in the literature.¹ Besides having been viewed as a synonym of *C. christina*, it has been attached to both *C. eurytheme* and *C. philodice vitabunda*.²⁴ As well it has been referenced as a hybrid situation.⁶ Kondla has reviewed this situation and determined that *alberta* is in fact allied with *C. christina*.¹⁷ This species, while widespread, is only locally common.

Canadian Sulphur *Colias canadensis* Ferris

LOCALITIES: 1j, 7m⁸

FLIGHT DATES: 30 May to 4 July

NOTES: This recently described species has in the past been reported as *Colias hecla*.

Giant Sulphur *Colias gigantea*
Strecker

LOCALITIES: 1j, 2j, 3a, 5d, 5g, 5j, 5y

FLIGHT DATES: 14 June to 8 July

NOTES: Adults appear to have a very short flight period, and are almost universally restricted to wet willow fens and catchment marshes with willows.

Pink-edged Sulphur *Colias interior*
Scudder

LOCALITIES: 1b, 2j, 3g, 4e, 5d, 7a, 7b, 7e, 7m

FLIGHT DATES: 21 June to 5 August

Palaeno Sulphur *Colias palaeno*
chippewa W.H. Edwards

FLIGHT DATES: June 18

NOTES: So far only found along

Highway 2, 56 km SE of Dawson Creek in Alberta.¹⁰

Bronze Copper *Lycaena hyllus* (Cramer)

LOCALITIES: 6c

FLIGHT DATES: 17 August

NOTES: A single battered male was collected in 1981. It could represent a local colony or a migrant. The specimen was collected while visiting alfalfa flowers near a marsh, and represents a range extension of about 320 km. Kondla reports that the species does use fens in central Alberta and since this species is easy to overlook, it may well be established in fens and marshes in the study area.¹⁸

Purplish Copper *Lycaena helloides* (Boisduval)

LOCALITIES: 2a, 4k, 5i, 5j, 5w, 6c

FLIGHT DATES: 29 June, 14 August to 22 August

NOTES: The taxonomy of this species and *L. dorcas* has been the subject of conflicting interpretations.^{7,28}

Based on work in Alberta we treat these two as distinct species. Specimens appear to be differentiated from populations in southern Alberta, but series are too short to be certain of constancy of differences.

Dorcas Copper *Lycaena dorcas dorcas* (W. Kirby)

LOCALITIES: 2f, 2j

FLIGHT DATES: 6 July

NOTES: So far only found in a black spruce bog a few miles west of Goodlow, BC, and along Highway 64 just east of the AB/BC border.

Mariposa Copper *Lycaena mariposa* (Reakirt)

LOCALITIES: 1h, 4e, 7e, 7f, 7m, 8e

COLLECTION DATES: 25 June to 1 August

Coral Hairstreak *Harkenclenus titus*

(Fabricius)

LOCALITIES: 1c, 1e, 1f, 1k, 1l, 1n, 2a, 5d, 5j, 6g, 8c

FLIGHT DATES: 28 June to 11 August

NOTES: Adults are consistently darker than adults of other populations in western North America. They appear to be otherwise similar. Due to the difference, description as a distinct subspecies may be warranted.

Adults are associated with the edge of native grassland, where they tend to perch on saskatoon bushes. Populations in the Fort St. John area were found to frequently display hilltopping behaviour which was not observed in those from the Peace River valley in Alberta.

Striped Hairstreak *Satyrium liparops* (Le Conte)

LOCALITIES: 1e, 1f, 1k, 1l, 2a, 5d, 5j, 6g, 7a, 7i

FLIGHT DATES: 26 June to 26 July

NOTES: Individuals of this species, both male and female, are different from all other specimens examined from North America in that they are darker and have a more uniform wing pattern. They may be worthy of description as a distinct subspecies.

Adults perch on spreading dogbane and saskatoon and chokecherry bushes. They do not hilltop as regularly as *H. titus* but do engage in this behaviour. They also appear to be territorial, and chase individuals of any insect species out of their territory.

Brown Elfin *Callophrys augustinus* (Westwood)

LOCALITIES: 3e, 5c, 5d, 5e, 5o, 7j, 8e, 8g

FLIGHT DATES: 3 May to 12 June

NOTES: Adults of this species are found in wet and boggy areas near

spruce and poplar forests, and in jackpine forests.

Hoary Elfin *Callophrys polios obscurus* (Ferris and Fisher)

LOCALITIES: 2 a, 3e, 5d, 5e, 5j, 5o, 5y, 7a, 7c

FLIGHT DATES: 26 April to 8 June

Eastern Pine Elfin *Callophrys niphon clarki* Freeman

LOCALITIES: 5d, 5o, 7l

FLIGHT DATES: 13 May to 23 May

NOTES: On comparison with adults of this subspecies from Clyde, Alberta, 11 specimens clearly represent this taxon. Their collection extends the range of this species westward from Wood Buffalo National Park and Clyde, AB.

Western Pine Elfin *Callophrys eryphon* (Boisduval)

LOCALITIES: 2a, 4j, 5d, 5o

FLIGHT DATES: 9 May to 19 June

NOTES: The occurrence of this species sympatrically with the preceding species raises the possibility of hybridization as suggested by Reist.²⁷

A single specimen taken north of Manning may also be referable to this species. Further study is required to clarify the relationship between these two species in northern Alberta.

Western Tailed Blue *Everes amyn-tula albrighti* Clench

LOCALITIES: 1c, 1d, 1e, 1f, 1h, 1i, 1k, 1l, 2a, 2e, 2h, 2j, 3a, 3b, 3d, 3e, 3g, 4d, 4e, 5d, 5e, 5g, 5h, 5i, 5j, 5u, 5x, 5y, 6f, 6g, 7a, 7i, 7m, 8c, 8d, 8e, 8g, 8h, 8i

FLIGHT DATES: 11 May to 1 August

Spring Azure *Celastrina argiolus lucia* (Kirby)

LOCALITIES: 1e, 2a, 2j, 3g, 4e, 5d, 5e, 5i, 5j, 5k, 5o, 5u, 5y, 7l, 8g

FLIGHT DATES: 7 April to 11 June

NOTES: Recent literature treats *lucia*

as a subspecies of *C. argiolus*. However recent research (H. Pavulaan, pers. comm.; Kondla, unpublished) shows that *argiolus* actually consists of a species complex and that *lucia* may be a distinct species.³⁰

Silvery Blue *Glaucopsyche lygdamus couperi* Grote

LOCALITIES: 1c, 1e, 1f, 1h, 1i, 1k, 1l, 2a, 2c, 2e, 2h, 2j, 3a, 3b, 3e, 3g, 4e, 4k, 5d, 5e, 5f, 5h, 5i, 5j, 5o, 5p, 5u, 5w, 5y, 6f, 6g, 7a, 7c, 7h, 7i, 7j, 8a, 8c, 8e, 8g, 8h, 8i

FLIGHT DATES: 26 April to 14 July

NOTES: Widely distributed in most habitats. Recent work suggests that the taxon *couperi* may be a distinct species from *G. lygdamus*.⁵

Northern Blue *Plebejus idas scud-deri* (Edwards)

LOCALITIES: 1e, 1h, 2j, 2h, 4e, 5d, 6g, 7e, 7f, 7m, 8c, 8e, 8f

FLIGHT DATES: 21 June to 11 August

NOTES: Case and Bird report specimens of this species as *P. melissa*.³ Their specimens have been re-examined and they are all females of *P. idas*.

Greenish Blue *Plebejus saepiolus amica* (W.H. Edwards)

LOCALITIES: 1a, 1b, 1c, 1d, 1e, 1f, 1h, 1i, 1j, 2a, 2c, 2e, 2h, 2j, 3a, 3b, 3c, 3d, 3h, 4d, 4e, 4f, 5d, 5f, 5h, 5i, 5u, 5x, 5y, 6f, 6g, 7b, 7e, 7i, 7k, 7m, 8b, 8c, 8e, 8g, 8i, 8k

FLIGHT DATES: 30 May to 26 July

NOTES: One of the ubiquitous species in the region.

Rustic Blue *Plebejus rusticus* (W.H. Edwards)

LOCALITIES: 1c, 1e, 1f, 2a, 3a, 3e, 4b, 4e, 5d, 5e, 5f, 5h, 5i, 5j, 6f, 7i, 8i

FLIGHT DATES: 11 May to 12 July

NOTES: A variety of genus and species names that have been applied to this taxon in recent years.¹⁹

Populations in the study area appear most closely allied with subspecies *rusticus* but work is needed to clarify the most appropriate subspecies nomenclature.

Adults fly on the native grasslands along the Peace River valley, and can also be found in jackpine sandhills. Colonies are small and do not appear to be numerous.

Nymphalidae

Great Spangled Fritillary *Speyeria cybele pseudocarpenteri* (F. and R. Chermock)

LOCALITIES: 1e, 1f, 1k, 2a, 2d, 2j, 3g, 4e, 5d, 5h, 5i

FLIGHT DATES: 28 June to 27 August

NOTES: This very aggressive flier can be found in shrub thickets on valley slopes, poplar draws on valley sides and upland poplar forest. Unlike individuals from more southern populations, adults in this study area very seldom nectar at flowers.

Aphrodite Fritillary *Speyeria aphrodite manitoba* (F. and R. Chermock)

LOCALITIES: 1e, 1f, 1h, 1k, 1l, 1m, 2a, 2j, 5d, 5e, 5g, 5h, 5i, 5j, 5u, 8i

FLIGHT DATES: 6 July to 7 September

NOTES: In the Peace River country adults of this species fly primarily in late July and early August, after the majority of adults of *S. electa* disappear. Its discovery in the Peace River region is a major range extension, and due to the habitat information provided by Kondla we expect that future field work in intervening areas will confirm that the Peace River populations are in fact disjunct from others.¹⁸

Boreal Fritillary *Speyeria hollandi*

(F. and R. Chermock)

LOCALITIES: 1e, 2j, 5d, 5e, 7a, 7b, 7e, 7i, 7m, 8a, 8b, 8c, 8d, 8e, 8f, 8i

FLIGHT DATES: 22 June to 21 August

NOTES: This species is usually found in boggy or heavily wooded areas. The taxonomic and nomenclatural argument provided by Kondla is followed for this and the following species.¹⁸

Northwestern Fritillary *Speyeria electa* (W.H. Edwards)

LOCALITIES: 1b, 1c, 1e, 1f, 1h, 1k, 1l, 1m, 2a, 2j, 3a, 3b, 3e, 3g, 3h, 4c, 4e, 5g, 5h, 5i, 5j, 5u, 5y, 6b, 6f, 6g, 7b, 7i

FLIGHT DATES: 6 June to 1 August

NOTES: Adults of this species appear in June with the flight period extending into July.

Mormon Fritillary *Speyeria mormonia eurynome* (W.H. Edwards)

LOCALITIES: 5u, 5w, 6g

FLIGHT DATES: 26 August

Bog Fritillary *Boloria eunomia dawsoni* (Barnes and McDunnough)

LOCALITIES: 2e, 2h, 5d, 5e, 5g, 5y, 8e, 8g

FLIGHT DATES: 8 June to 23 June

Silver-bordered Fritillary *Boloria selene* (Denis and Schiffermueller)

LOCALITIES: 1d, 2h, 3a, 3g, 4a, 5b, 5d, 5i, 5k, 5u, 5y, 6b, 7a, 7d, 7e, 7m, 8e

FLIGHT DATES: 6 June to 25 July

Meadow Fritillary *Boloria bellona jenistae* Stallings and Turner

LOCALITIES: 1c, 1f, 1l, 2a, 2h, 3e, 3g, 4e, 5d, 5e, 5h, 5i, 5j, 5u, 5v, 6f, 6g, 7a, 7b, 7i, 8c, 8e, 8g, 8h, 8i

FLIGHT DATES: 9 May to 28 June; 13 August to 25 August

NOTES: In the Peace River country this species is double brooded. Adults fly in old fields, forest

openings, and edges of grassland areas. Pike found that eggs are laid on violets.

Frigga's Fritillary *Boloria frigga saga* (Staudinger)

LOCALITIES: 2i, 2j, 3g, 5d, 5e, 5h, 5y, 8g, 8j

FLIGHT DATES: 19 May to 23 June

Freija Fritillary *Boloria freija* (Thunberg)

LOCALITIES: 2a, 2i, 2j, 3g, 4e, 5c, 5d, 5e, 5o, 5y, 7a, 7c, 7l, 7n, 8g, 8h

FLIGHT DATES: 26 April to 11 June

Purple Fritillary *Boloria titania grandis* (Barnes and McDunnough)

LOCALITIES: 2f, 2j, 5d, 5e, 7e, 7f, 7m, 8i

FLIGHT DATES: 17 June to 23 August

Gorgone Checkerspot *Chlosyne gorgone* (Huebner)

LOCALITIES: 5i, 5h

FLIGHT DATES: 17 May to 26 June

NOTES: An uncommon and local species in Alberta, adults are rarely collected in series. In 1980, a small colony was discovered at Green Island. Extensive investigations yielded another small colony at Dunvegan in 1983. These are the only known colonies in the Peace River region to date.

The colonies cover an area of about 1/4 ha, and within that area, adults are fairly abundant. Outside of that area, adults are rarely encountered. In over 100 hours of collecting, only one specimen has ever been seen over 100 m from a colony.

Northern Checkerspot *Chlosyne palla* (Boisduval)

LOCALITIES: 1c, 1k, 2a, 5f, 5h, 5j, 6g, 7a, 7i, 8c, 8i

FLIGHT DATES: 23 May to 14 July

NOTES: Although Case and Bird fail

to report this species, the first known specimen was collected by J. Belicek at Peace River town site in 1973, and a series of over 100 specimens now exists in collections. Adults primarily inhabit valley-side poplar forests where the presumed food plant, *Aster conspicuus*, grows in the understory. However, adults are best observed at the poplar forest/grassland interface where they visit flowers of alfalfa and spreading dogbane and *Senecio* sp.

There is some question as to the correct placement of this taxon. It is clearly distinct from both *C. palla* in southern Alberta and British Columbia, but it is also distinct from *C. acastus* from southern Alberta prairies. It is placed with *C. palla* largely because Alberta *C. acastus* has a monotone orange ground color on the dorsal surface, and *C. palla* has a two-toned ground color. The Peace River material has a two-toned ground color.

Northern Crescent *Phyciodes morphheus* (Drury)

LOCALITIES: 1a, 1b, 1d, 1e, 1f, 1h, 1k, 2b, 2e, 2h, 2j, 3a, 3b, 3e, 3g, 4c, 4e, 5d, 5f, 5g, 5h, 5i, 5j, 5k, 5u, 5x, 6b, 6f, 6g, 6h, 7a, 7c, 7e, 7i, 7k, 8b, 8c, 8e, 8f, 8g, 8i

FLIGHT DATES: 28 May to 23 August

NOTES: Adults are found in or near forested areas, and at the edges of poplar forests along river bottoms.

Tawny Crescent *Phyciodes batesii* (Reakirt)

LOCALITIES: 1c, 1e, 1f, 1k, 1l, 2a, 2j, 3e, 4b, 4e, 5j, 5h, 5i, 6g, 7a, 7i

FLIGHT DATES: 23 May to 14 July

NOTES: Larvae are web spinners, which is a reliable character in separating this species from the preceding one. This species is found around the shrubs of the grasslands,

and is not often found flying with *P. morpheus*.

Field Crescent *Phyciodes pratensis* (Behr)

LOCALITIES: 1h

FLIGHT DATES: 26 June

NOTES: So far only found in the Dunlevy area.

Satyr Anglewing *Polygonia satyrus* (W.H. Edwards)

LOCALITIES: 1h, 3g, 4b, 5d, 5e, 5l, 5j, 6g, 7a, 7c

FLIGHT DATES: 17 April to 30 June (hibernating generation), and 15 July to 18 August (new generation).

NOTES: Adults are found in any forested area where shaded stinging nettles are found. Pike confirmed stinging nettle as a larval food plant in this area.

Green Comma *Polygonia faunus* (W.H. Edwards)

LOCALITIES: 1f, 1h, 2a, 5d, 7b, 8a

FLIGHT DATES: 11 April to 17 August

Hoary Comma *Polygonia gracilis* Grote and Robinson

LOCALITIES: 3g, 5e, 8j

FLIGHT DATES: 21 April to 11 June

NOTES: Specimens are provisionally listed under this taxon for lack of a better available name. Individuals from most parts of the boreal forest in northern Alberta and British Columbia are black and gray on the ventral surface while nominate *gracilis* is two-toned brown on the ventral surface. More work is needed on the taxa *gracilis* and *zephyrus* in this part of the continent.¹⁸

Gray Comma *Polygonia progne* (Cramer)

LOCALITIES: 1f, 2a, 3g, 5d, 5i, 5j, 6g, 8i

FLIGHT DATES: 17 April to 26 August

NOTES: Adults are found in and near poplar forests where willow is growing.

Compton Tortoise Shell *Nymphalis vau-album* (Denis and Schiffermuel-ler)

LOCALITIES: 1e, 1h, 3g, 4 e, 5d

FLIGHT DATES: 24 May to 17 August

Mourning Cloak *Nymphalis antiopa* (Linnaeus)

LOCALITIES: 1e, 1f, 2a, 3g, 4b, 4e, 5d, 5h, 5i, 5j, 5k, 5w, 5z, 6g, 8c

FLIGHT DATES: 16 April to 23 August

Milbert's Tortoise Shell *Nymphalis milberti* (Say)

LOCALITIES: 1e, 1f, 1h, 1j, 2f, 2h, 3g, 4e, 4k, 5d, 5h, 5i, 6g, 7k, 7m

FLIGHT DATES: 25 May to 14 August

Painted Lady *Vanessa cardui* (Linnaeus)

LOCALITIES: 1c, 1f, 1n, 2a, 5i, 5u, 5w

FLIGHT DATES: 28 May to 8 September

NOTES: A large migration into the Peace River area occurred in 1979. Many fresh adults were seen throughout the area in August and September. Smaller migrations occurred in 1991 and 1992.

Red Admiral *Vanessa atalanta rubria* (Fruhstorfer)

LOCALITIES: 5w, 6g, 8c, 8e, 8h

FLIGHT DATES: 10 June to 17 June

White Admiral *Limenitis arthemis rubrofasciata* (Barnes and McDunnough)

LOCALITIES: 1c, 1e, 1f, 1h, 1k, 1l, 2a, 2e, 2h, 2j, 3a, 3e, 3g, 4b, 4c, 4e, 5d, 5e, 5f, 5g, 5h, 5i, 5j, 5y, 6b, 6g, 7a, 7b, 7c, 7h, 7i, 7k, 8e, 8i

FLIGHT DATES: 7 June to 11 August

Inornate Ringlet *Ceononympha inornata* McDunnough

LOCALITIES: 1c, 1d, 1e, 1f, 1i, 1j, 1k, 1l, 2a, 2c, 3b, 3e, 3g, 4b, 4c, 4d, 4e, 4f, 4k, 5d, 5f, 5g, 5h, 5i, 5j, 5u, 5w, 5y, 6d, 6f, 6g, 8c, 8g, 8i

FLIGHT DATES: 11 May to 16 July

NOTES: Adults of this taxon appear to be somewhat differentiated from adults of this taxon from elsewhere in Alberta. There is a tendency to be darker, and a reduction or absence of eyespots on the forewing. This, at least, is true of populations from the native grasslands. Roadside populations do not show these tendencies. Thus there may be native and introduced populations with limited interaction between them.

Common Wood Nymph *Cercyonis pegala ino* (Hall)

LOCALITIES: 1e, 1f, 1k, 1l, 2a, 2j, 3g, 3h, 4i, 5d, 5h, 5i, 5j, 5k, 5u, 5w, 6d, 7a, 7b, 7f, 7i

FLIGHT DATES: 28 June to 23 August

NOTES: Specimens collected from native grasslands appear darker than specimens from southern Alberta, but specimens from road sides in the Alberta part of the region are much like the rest of the Alberta populations. Here, as in the preceding species, there may be native and introduced populations interacting.

Dark Wood Nymph *Cercyonis oetus* (Boisduval)

LOCALITIES: 1c, 1e, 1f, 1i, 1l, 1n, 2a

FLIGHT DATES: 4 July to 11 August

NOTES: This species seems to be restricted to the BC side of the Peace River valley, and many adults are substantially darker than adults from other areas of British Columbia and Alberta.

Disa Alpine *Erebia disa mancina* Doubleday

LOCALITIES : 2j

FLIGHT DATES: 3 June

NOTES: So far only found in a spruce bog west of Goodlow, BC. Relatively little work was done in spruce bogs and this species is certainly more widely distributed in the region than this one record would indicate.

Red Disked Alpine *Erebia discoalidis macdunnoughi* Dos Passos

LOCALITIES: 1g, 1j, 2j, 3g, 5c, 5d, 5e, 5i, 5u, 5y, 7i, 7l

FLIGHT DATES: 26 April to 24 May

NOTES: This species was reared by Pike (unpublished), and the life cycle photographed and described. The most noteworthy point of the life cycle is that mature larvae spin flimsy cocoons before pupating.

Common Alpine *Erebia epipsodea freemani* Erhlich

LOCALITIES: 1c, 1e, 1f, 1h, 1i, 1j, 1k, 1l, 2a, 3g, 3h, 4b, 4d, 4e, 4k, 5d, 5f, 5h, 5i, 5j, 5u, 5w, 5y, 7i, 7l

FLIGHT DATES: 13 May to 28 June

Macoun's Arctic *Oeneis macounii* (W.H. Edwards)

LOCALITIES: 4j, 5e, 8e, 8i

FLIGHT DATES: 11 June to 20 June

NOTES: Adults fly in the vicinity of jackpine sandhills and will hilltop.

Uhler's Arctic *Oeneis uhleri* (Reakirt)

LOCALITIES: 1c, 1e, 1f, 1k, 1l, 2a, 4b, 4e, 5f, 5h, 5i, 5j, 6g, 7i

FLIGHT DATES: 7 May to 3 July

NOTES: Adults from the Peace River valley are distinct from adults collected in other parts of Alberta in that they are mostly larger, darker and have more eyespots.

Females oviposit on many species of grasses, and eggs take about three weeks to hatch. Mature larvae pupate in early May.

Alberta Arctic *Oeneis alberta* Elwes
LOCALITIES: 2a, 4e, 5d, 5e, 5i, 5j, 5z, 6f, 6g
FLIGHT DATES: April 26 to June 18
NOTES: First reported by Kondla from Kleskun Hill. Adults of this taxon are locally common along the Peace River in the native grasslands from Clayhurst to Peace River. They are also found occasionally in jack-pine sandhills. This is one of the first butterflies to fly in the spring. Females oviposit on many species of grasses, and eggs hatch in about 30 days. Mature larvae overwinter and pupation occurs in early April, often before the snow has completely melted.

Peace River populations may represent a distinct subspecies which is being investigated by Pike.

Jutta Arctic *Oeneis jutta ridingiana*
F. and R. Chermock
LOCALITIES: 2j, 5d, 5e, 8e
FLIGHT DATES: 3 June to 13 June

Discussion A total of 76 species have now been documented for this study area. We have not included a number of taxa collected by K. Bowman in 1925 at an undetermined location near Fort Vermilion. Although specimens are in the collection of the University of Alberta, the exact locality where these were collected is unknown and may not be within the study area as defined herein. Efforts by the writers and G.J. Hilchie to find the source of Bowman's records, both in the field and through file information, have been unsuccessful.

Only a few species are candidates for future addition to the fauna of the study area:

Manitoba Skipper *Hesperia comma*

manitoba (Scudder) — MacNeil reports one female collected 24 August 1961 at Hotchkiss River.²² We treat this as a hypothetical species at this time because we have not been able to verify the identification and this taxon is known from only one other location in the boreal forest of Alberta. The flight date strongly suggests that this specimen could be *H. assiniboia*. The taxonomy of *Hesperia* in North America needs more work, especially to determine relationships (if any) to European *Hesperia comma*.

Peck's Skipper *Polites peckius* (W. Kirby) — This species has been found north, south, east and west of the study area, so it is just a matter of time before it is discovered here. It should be looked for in fens, marshes and moist meadows.

California White *Pieris sisymbrii* (Boisduval) — Specimens were collected by K. Bowman in the vicinity of Fort Vermilion and further work may yet confirm the presence of this species in the study area.

Melissa Blue *Plebejus melissa* W.H. Edwards — Two males and one female collected by K. Bowman at Wembly in 1925 appear to be of this species. Genitalia have not been examined and more work is needed to clarify whether or not this species does occur in the study area.

Yukon Blue *Plebejus optilete yukona* (Holland) — This species has been found northwest, east and southeast of the study area. Field work in spruce bogs during early July will likely turn up populations in the study area.

Chryxus Arctic *Oeneis chryxus caryi* Dyar — Specimens were collected by K. Bowman in the general

area of Fort Vermilion. This species was reported by Case and Bird but we have been unable to verify their record.³ Additional exploration of pine forests in June is needed to determine if this taxon occurs in the study area.

Analysis of the adult flight phenology data (Table 2) shows that two-thirds of the species are on the wing in late June. Relatively high species diversity can be observed from mid-May through early July. Substantially fewer species are on the wing in late April to early May and mid-July to late August.

The northern limit of the study area is almost as far north as Churchill, Manitoba, which is well known for its arctic and subarctic butterflies. The Peace River region is unique as a northern area due to its high species diversity and due to disjunct and range-edge populations of species that are distinctly southern in their primary distribution. Thus the study area is at the limits of the range of 23 taxa.

Taxa which are at the northern and northwestern limits of their range here are: *O. garita*, *H. assiniboia*, *P. mystic dacotah*, *A. vialis*, *H. titus*, *S. liparops*, *S. cybele pseudocarpenteri*, *C. pegala*, *O. uhleri* ssp., and *O. alberta*. *S. aphrodite manitoba*, *P. batesii* and *C. inornata* nr. *benjamini* are at their western and northwestern range limits here. The following taxa are at their northwestern range limits here: *P. communis*, *L. hyllus*, *L. helloides*, *P. rusticus* nr. *rusticus*, *C. gorgone*. Three taxa are at their northern range limits here: *P. zeli-caon*, *C. palla*, and *C. oetus*. *C. niphon* and *E. epipsodea freemani* are at their western range limits. It is interesting to note that none of the taxa in the study area are at their

southern or southeastern range limits here.

Ten of these taxa are also clearly disjunct for distances of 200 to 500 km from the nearest related populations to the south and southeast: *P. communis*, *O. garita*, *H. assiniboia*, *P. machaon pikei*, *H. titus*, *S. liparops*, *C. gorgone*, *C. palla*, *O. uhleri* and *O. alberta*. These same taxa also have highly circumscribed distributions within the study area, being wholly or largely confined to the Peace River valley and, in some cases, nearby tributary stream valleys. *Cercyonis oetus* is also disjunct but is limited to the western part of the study area and flies outside of the Peace River lowlands as well. Five taxa may be disjunct but additional work in areas to the east and southeast is needed to clarify this: *L. hyllus*, *L. helloides*, *P. rusticus* nr. *rusticus*, *S. aphrodite manitoba*, and *C. inornata* nr. *benjamini*.

1. BOWMAN, K. 1942. A note on *Colias eurytheme* Bdv., with description of a new race (Lepidoptera, Pieridae). *Can. Ent.* 74:25.
2. ——— 1951. An annotated list of the Lepidoptera of Alberta. *Can. J. of Zoology* 29:121-165.
3. CASE, J.W. and C.D. BIRD. 1977. Butterflies and skippers of west-central Alberta. *Blue Jay* 35:208-219.
4. CASE, V. and J. CASE. 1980. Bear Canyon Area. pp.284-285 in SPALDING, D. A. E. (senior editor). A nature guide to Alberta. Provincial Museum of Alberta Publication No. 5. Hurtig, Edmonton. 368 pp.
5. DIRIG, R. and J.F. CRYAN. 1991. The status of Silvery Blue subspecies (*Glaucopsyche lygdamus lygdamus* and *G. l. couperi*: Lycaenidae) in New York. *J. of the Lepidopterists' Soc.* 45:272-290.
6. FERRIS, C.D. 1972. Notes on certain species of *Colias* (Lepidoptera, Pieridae) found in Wyoming and associated regions. *Bull. of the Allyn Museum* 5:1-23.

7. — 1977. Taxonomic revision of the species *dorcas* Kirby and *helioides* Boisduval in the genus *Epidemia* Scudder (Lycaenidae:Lycaeninae). *Bull. of the Allyn Museum* 45:1-42.
8. — 1982. Revision of North American *Colias hecla* Lefebvre (Pieridae: Coliadinae). *Bull. of the Allyn Museum* 71:1-19.
9. — 1987. A revision of the North American Salix-feeding *Colias* species (Pieridae:Coliadinae). *Bull. of the Allyn Museum* 112:1-25.
10. — 1988a. Revision of several North American leguminosae-feeding *Colias* species, with description of a new subspecies (Pieridae:Coliadinae). *Bull. of the Allyn Museum* 116:1-28.
11. — 1988b. Revision of the North American Ericaceae[sic]-feeding *Colias* species (Pieridae:Coliadinae). *Bull. of the Allyn Museum* 122:1-34.
12. HAGEN, R.H., R.C. LEDERHOUSE, J.L. BOSSART and J.M. SCRIBER. 1991. *Papilio canadensis* and *P. glaucus* (Papilionidae) are distinct species. *J. of the Lepidopterists' Soc.* 45:245-258.
13. HILCHIE, G.J. 1985. The tiger beetles of Alberta (Coleoptera: Carabidae, Cicindelini). *Quaestiones Entomologicae* 21:319-347.
14. HOWE, W.H. (ed.). 1975. The butterflies of North America. Doubleday and Co. Inc. New York. 632 pp.
15. KONDLA, N.G. 1985. Skippers and butterflies of a boreal forest sand dune area in Alberta. *Alberta Naturalist* 15:42-48.
16. — 1986. Skippers and butterflies of the Kootenay Plains, Alberta. *Alberta Naturalist* 16:11-14.
17. — 1991. A discussion on the correct status of *Colias eurytheme alberta*. *Utahensis* 6:44-45.
18. — 1992. An update on the butterflies of the Redwater sand dunes. *Alberta Naturalist* 22:10-17.
19. KONDLA, N.G. and C. SCHMIDT. 1991. Fall emergence of *Plebejus rusticus*. *Alberta Naturalist* 21:50.
20. LARSON, D.J. 1975. The predaceous water beetles (Coleoptera: Carabidae, Cicindelini). *Quaestiones Entomologicae* 21:319-347.
21. LLEWELLYN-JONES, J.R.J. 1951. An annotated check list of the macrolepidoptera of British Columbia. Ent. Soc. of British Columbia, Occasional Paper No. 1. 148 pp.
22. MACNEIL, C.D. 1964. The skippers of the genus *Hesperia* in western North America with special reference to California (Lepidoptera:Hesperiidae). *University of California Publications in Entomology* 35:1-222.
23. MILLER, J.Y. 1992. The common names of North American butterflies. Smithsonian Institution Press, Washington. 177 pp.
24. MILLER, L.D. and F.M. BROWN. 1981. A catalogue/checklist of the butterflies of America North of Mexico. The Lepidopterists' Society Memoir No. 2. 280 pp.
25. MOSS, E.H. 1952. Grassland of the Peace River region, western Canada. *Can. J. of Botany* 30:98-124.
26. — 1953. Forest communities in northwestern Alberta. *Can. J. of Botany* 31:212-252.
27. REIST, J.D. 1979. *Callophrys niphon* (Lycaenidae) in Alberta with notes on the identification of *C. niphon* and *C. eryphon*. *J. of the Lepidopterists' Soc.* 33:248-253.
28. SCOTT, J.A. 1979. The identity of the Rocky Mountain *Lycaena dorcas-helioides* complex. *J. of Research on the Lepidoptera* 17:40-50.
29. — 1986. The butterflies of North America: a natural history and field guide. Stanford University Press, Stanford. 583 pp.
30. — 1992. Hostplant records for butterflies and skippers (mostly from Colorado) 1959-1991, with new life histories and notes on oviposition, immatures and ecology. *Papilio* (New Series) 6:1-171.
31. SHEPARD, J.H. 1981. (compiler) Zone 2: Pacific Northwest: Oregon, Washington, British Columbia. p. 15 in 1980 Season Summary, *News of the Lepidopterists' Soc.* 1981(2):13-28.
32. — 1982. (compiler) Zone 2: Pacific Northwest: Oregon, Washington, British Columbia. p.16 in 1981 Season Summary, *News of the Lepidopterists' Soc.* 1982(2):13-31.

33. — 1983. (compiler) Zone 2 Pacific Northwest: Oregon, Washington, British Columbia. pp.15-16 in 1982 Season Summary, *News of the Lepidopterists' Soc.* 1983(2):13-35.
34. — 1984. (compiler) Zone 2 Pacific Northwest: Idaho, Oregon, Washington, British Columbia. pp. 14-15 in 1983 Season Summary, *News of the Lepidopterists' Soc.* 1984(2):13-33.
35. — 1990. (compiler) Zone 2 Pacific Northwest: Idaho, Oregon, Washington, British Columbia. pp. 14-15 in 1989 Season Summary, *News of the Lepidopterists' Soc.* 1990(2): 13-34.
36. SOPER, J.D. 1948. Mammal notes from the Grande Prairie-Peace River region, Alberta. *J. of Mammalogy* 29:49-64.
37. — 1949. Birds observed in the Grande Prairie-Peace River region of northwestern Alberta, Canada. *Auk* 66:233-257.
38. SPALDING D.A.E. (senior editor) 1980. A nature guide to Alberta. Provincial Museum of Alberta Special Publication No. 5. Hurtig. 368 pp.
39. SPERLING, F.A.H. 1987. Evolution of the *Papilio machaon* species group in Western Canada. *Quaestiones Entomologicae* 23:198-315.
40. SPERLING, F.A.H. and N.G. KONDLA. 1991. Alberta Swallowtails and Parnassians: natural history, keys and distribution. *Blue Jay* 49:183-192.
41. STANFORD, R.E. 1980. (compiler) Zone 3 (Rocky Mountains): Alberta, Montana, Wyoming, Utah, Colorado and New Mexico. p. 15 in 1979 Season Summary, *News of the Lepidopterists' Soc.* 1980(2):13-27.
42. — 1982. (compiler) Zone 3: Rocky Mountains: Alberta, Idaho, Montana, Wyoming, Utah, Colorado, and New Mexico. p. 17 in 1981 Season Summary, *News of the Lepidopterists' Soc.* 1982(2):13-31.
43. — 1983. (compiler) Zone 3. Rocky Mountains: Alberta, Idaho, Montana, Utah, Colorado and New Mexico. p 16-17 in 1982 Season Summary, *News of the Lepidopterists' Soc.* 1983(2):13-35.
44. — 1992. (compiler) Zone 4. Rocky Mountains: Alberta, Montana, Wyoming, Utah, Colorado and New Mexico. p 6-13 in 1991 Season Summary, *News of the Lepidopterists' Soc.* 1992(2):1-31.

**Table 1. LIST OF SPECIFIC COLLECTING SITES
WITH REFERENCE NUMBERS SHOWN ON FIGURE 1**

1a 5-7 km NE of Hudson Hope b 15 km SW of Attachie c 3 km NW of Attachie d 15 km W of Fort St. John e District of Taylor f Beatton River ENE of Fort St. John g Cecil Lake h Bullhead Mountain and Dunlevy areas adjacent to Williston Lake (low elevations) i Beatton River 8 km NE of Rose Prairie j Alaska Highway, Milepost 29 k 10 km E of Taylor l Bear Flat m Halfway Indian Reserve and vicinity	5b 3 km N of Hines Creek c George Lake d Sandhill Lake e Gage f Highland Park g 30 km W of Fairview h Dunvegan i Green Island j 16 km SE of Fairview k 13 km S of Bluesky l 8 km S of Bluesky n Camp Island, 20 km S of Whitelaw o 7 km S of Whitelaw p 4 km SE of Whitelaw q Whitelaw r 5 km SW of Brownvale s Figure 8 Lake, 13 km N of Brownvale u 10 km SW of Fairview w Fairview x 3 km N of Fairview y 11 km N of Fairview z Fairview Ski Hill
2a Clayhurst Bridge b 6.5 km S of Bear Canyon c Bear Canyon d Highway 64 at Clear River e Boundary Lake f Highway 64, 3 km E of AB/BC boundary g 22 km N of Bear Canyon h 30 km N of Bear Canyon i 11 km W of Worsley j N of Clayhurst and Goodlow area	6a 18 km S of Dixonville b Lac Cardinal c 2 km S of Lac Cardinal d Grimshaw e 16 km SE of Grimshaw f Shaftsebury Ferry g Peace River (town) h 10 km S of Peace River
3a Sunset Prairie b Bear Mountain c Demmitt d White Mountain fire lookout tower, 25 km SW of Spirit River e Spirit Ridge, 14 km S of Spirit River f 2 km E of Woking g Codessa fire lookout tower, 14 km S of Codessa h Pouce Coupe	7a 16 km E of Northstar b 20 km E of Northstar c 14 km E of Deadwood d Deadwood fire tower, 10 km S of Deadwood e 25 km S of Manning
4a 21 km W of Elmworth b Beaverlodge c Wembly d 2 km S of Clairmont Lake e Kleskun Hill f Highway 34 at Smokey River g Debolt h 3 km W of Calais i 25 km W of High Prairie j 10 km S of Grande Prairie k Grande Prairie	

Table 2. ADULT BUTTERFLY FLIGHT PHENOLOGY

'X' = species has been found in a phenology unit, 'o' = it has not. Each month is divided into 3 phenology units; the first days 1-10, the second days 11-20 and the third days 21-end.

SPECIES	APR	MAY	JUN	JUL	AUG	SEP
<i>Thorybes pylades</i>	ooo	oXX	XXX	oXo	ooo	ooo
<i>Erynnis icelus</i>	ooo	XXX	XXX	ooo	ooo	ooo
<i>Erynnis persius</i>	ooo	oXX	XXX	ooo	ooo	ooo
<i>Pyrgus centaureae</i>	ooo	ooo	Xoo	ooo	ooo	ooo
<i>Pyrgus communis</i>	ooo	oXo	XXX	oXo	XXX	ooo
<i>Carterocephalus palaemon</i>	ooo	oXX	XXX	Xoo	ooo	ooo
<i>Oarisma garita</i>	ooo	ooX	XXX	Xoo	ooo	ooo
<i>Hesperia assiniboia</i>	ooo	ooo	ooo	ooo	XXX	ooo
<i>Polites mystic</i>	ooo	ooo	oXX	XXX	oXo	ooo
<i>Amblyscirtes vialis</i>	ooo	oXX	XXX	ooo	ooo	ooo
<i>Papilio machaon</i>	ooo	ooX	XXX	XXo	ooo	ooo
<i>Papilio zelicaon</i>	ooo	oXX	XoX	Xoo	ooo	ooo
<i>Papilio canadensis</i>	ooo	oXX	XXX	XXo	ooo	ooo
<i>Pieris occidentalis</i>	XoX	XXX	XXX	XXX	XXX	Xoo
<i>Pieris napi</i>	ooo	XXX	XXo	ooX	ooo	ooo
<i>Pieris rapae</i>	ooX	XXX	XXX	XXX	XXX	Xoo
<i>Euchloe ausonides</i>	ooo	oXX	XXX	ooo	Xoo	ooo
<i>Euchloe creusa</i>	ooo	ooo	ooX	ooo	ooo	ooo
<i>Colias philodice</i>	ooo	XXX	XXX	XXX	XXX	XoX
<i>Colias christina</i>	ooo	ooo	ooX	XoX	XXo	ooo
<i>Colias canadensis</i>	ooo	ooX	ooo	Xoo	ooo	ooo
<i>Colias gigantea</i>	ooo	ooo	oXX	Xoo	ooo	ooo
<i>Colias interior</i>	ooo	ooo	ooX	XoX	Xoo	ooo
<i>Colias palaeno</i>	ooo	ooo	oXo	ooo	ooo	ooo
<i>Lycaena hyllus</i>	ooo	ooo	ooo	ooo	oXo	ooo
<i>Lycaena helloides</i>	ooo	ooo	ooX	ooo	oXX	ooo
<i>Lycaena dorcas</i>	ooo	ooo	ooo	Xoo	Xoo	ooo
<i>Lycaena mariposa</i>	ooo	ooo	ooX	ooX	Xoo	ooo
<i>Harknclenus titus</i>	ooo	ooo	ooX	XXX	Xoo	ooo
<i>Satyrrium liparops</i>	ooo	ooo	ooX	XXX	ooo	ooo
<i>Callophrys augustinus</i>	ooo	XXX	oXo	ooo	ooo	ooo
<i>Callophrys polios</i>	ooX	XXX	Xoo	ooo	ooo	ooo
<i>Callophrys niphon</i>	ooo	oXX	ooo	ooo	ooo	ooo
<i>Callophrys eryphon</i>	ooo	XXo	oXo	ooo	ooo	ooo
<i>Everes amyntula</i>	ooo	XXX	XXX	XXo	Xoo	ooo
<i>Celastrina argiolus</i>	XoX	XXX	XXo	Xoo	ooo	ooo
<i>Glaucopsyche lygdamus</i>	ooX	XXX	XXX	Xoo	ooo	ooo
<i>Plebejus idas</i>	ooo	ooo	ooX	XXo	XXo	ooo
<i>Plebejus saepiolus</i>	ooo	ooX	XXX	XXX	ooo	ooo
<i>Plebejus rusticus</i>	ooo	XXX	XXX	oXo	ooo	ooo
<i>Speyeria cybele</i>	ooo	ooo	ooX	XXo	XXX	ooo
<i>Speyeria aphrodite</i>	ooo	ooo	ooo	XXX	XXX	Xoo
<i>Speyeria hollandi</i>	ooo	ooo	ooX	ooo	XXo	ooo
<i>Speyeria electa</i>	ooo	ooo	XXX	XXX	Xoo	ooo
<i>Speyeria mormonia</i>	ooo	ooo	ooo	ooo	ooX	ooo
<i>Boloria eunomia</i>	ooo	ooo	XXX	ooo	ooo	ooo
<i>Boloria selene</i>	ooo	oXo	XXX	XXX	ooo	ooo
<i>Boloria bellona</i>	ooo	XXX	XXX	Xoo	XXX	ooo
<i>Boloria frigga</i>	ooo	oXX	XXX	ooo	ooo	ooo
<i>Boloria freija</i>	ooX	XXX	XXo	ooo	ooo	ooo
<i>Boloria titania</i>	ooo	ooo	ooo	ooX	XXX	ooo

Table 2 (continued) ADULT BUTTERFLY FLIGHT PHENOLOGY

SPECIES	APR	MAY	JUN	JUL	AUG	SEP
<i>Chlosyne gorgone</i>	000	oXX	XXX	000	000	000
<i>Chlosyne palla</i>	000	ooX	XXX	XXo	000	000
<i>Phyciodes morpheus</i>	000	ooX	XXX	XXo	XXo	000
<i>Phyciodes batesii</i>	000	ooX	XXX	XXo	000	000
<i>Phyciodes pratensis</i>	000	000	ooX	000	000	000
<i>Polygonia satyrus</i>	oXX	XXX	ooX	oXX	XXX	000
<i>Polygonia faunus</i>	oXX	oXX	Xoo	000	XXX	000
<i>Polygonia gracilis</i>	ooX	oXX	XXo	000	000	000
<i>Polygonia progne</i>	oXX	XXX	XXX	000	XXX	000
<i>Nymphalis vau-album</i>	000	ooX	ooX	000	XXo	000
<i>Nymphalis antiopa</i>	ooX	XXX	XXX	000	XXX	000
<i>Nymphalis milberti</i>	000	XXX	oXX	oXo	XXo	000
<i>Vanessa cardui</i>	000	ooX	XXo	000	Xoo	Xoo
<i>Vanessa atalanta</i>	000	000	XXo	000	000	000
<i>Limenitis arthemis</i>	000	000	XXX	XXo	XXo	000
<i>Coenonympha inornata</i>	000	oXX	XXX	XXo	000	000
<i>Cercyonis pegala</i>	000	000	ooX	XXX	XXX	000
<i>Cercyonis oetus</i>	000	000	000	XXX	XXo	000
<i>Erebia disa</i>	000	000	Xoo	000	000	000
<i>Erebia discoidalis</i>	ooX	XXX	000	000	000	000
<i>Erebia epipsodea</i>	000	oXX	XXX	000	000	000
<i>Oeneis macounii</i>	000	000	oXo	000	000	000
<i>Oeneis uhleri</i>	000	XXX	XXX	Xoo	000	000
<i>Oeneis alberta</i>	ooX	XXX	XXo	000	000	000
<i>Oeneis jutta</i>	000	000	XXo	000	000	000

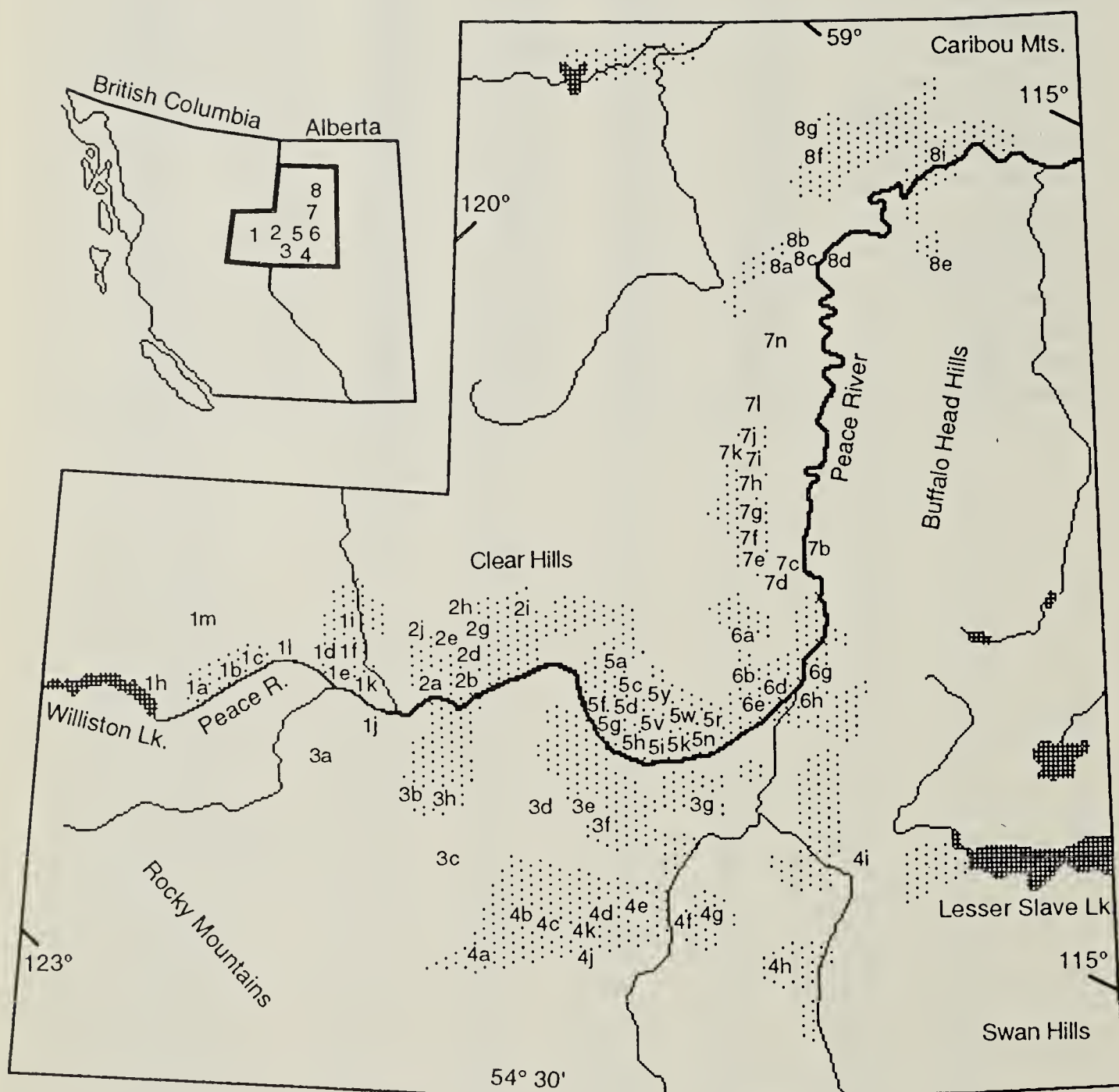


Figure 1. LOCATION OF COLLECTING SITES LISTED IN TABLE 1.

Stippled portions show areas identified as containing native grasslands.²⁵ Insert shows study region within Alberta and British Columbia, with numbers showing eight general collecting areas. Some sites are not shown because they would overlap nearby sites in the figure; missing sites can be related to nearby sites by using Table 1.

CHECK LIST OF SASKATCHEWAN MOTHS PART 12: DART MOTHS

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Abbreviations used: s = south; n = north; w = west; e = east; DA = Department of Agriculture collection; CNC = the only known Saskatchewan records of the species that we know of are in the Canadian National Collection in Ottawa. (Unless otherwise indicated, all the species are represented in the collection of the Royal Saskatchewan Museum, formerly called the Saskatchewan Museum of Natural History.) The species are arranged according to the *Check List of the Lepidoptera of North America* (R.W. Hodges, 1983).

Dart Moths (Noctuinae)

These are Owlet Moths with naked eyes, spined middle and hind tibiae, and trifid venation on the hind wings (meaning that in this sub-family and some of the others that the mid-hind wing vein branches into three branches near the outer edge of the wing).

This is our largest sub-family of Owlet Moths. It contains many destructive cutworm moths that feed on a great variety of plants. Nearly all of the species are a drab brown in colour. An exception to this is the Catocaline Dart Moth, which has black-banded, yellow hind wings and is thus named after the underwing moths.

Part A — *Agrotis*, *Onychagrotis*, *Feltia*, *Copablepharon* and *Euxoa*

Old Man Dart — *Agrotis vetusta* Wlk. — s Sask., n to La Ronge.

Daedalus Dart — *Agrotis daedalus* (Sm.) — Swift Current, Portreeve and Saskatoon.

Mollis Dart — *Agrotis mollis* Wlk. — n Sask., s to Shoal Lake, MacDowall, Richard and Cutknife.

Pale Western Cutworm — *Agrotis orthogonia* (Morr.) — s Sask., n to Aylsham.

King's Dart — *Agrotis kingi* McD. — Saskatoon (CNC).

Robust Dart — *Agrotis robustior* (Sm.) — s Sask., n to Indian Head, Earl Grey, Saskatoon and Cochin.

Venerable Dart — *Agrotis venerabilis* Wlk. — s Sask., n to Red Earth.

Vancouver Dart — *Agrotis vancouverensis* Grt. — Piapot and Cypress Hills.

Musa Dart — *Agrotis musa* (Sm.) — reported for Saskatchewan by J.D. LaFontaine.



Dark Sword Grass (*Agrotis ipsilon* (Hufn.))

Keith Roney

Pointed Dart — *Agrotis stigmosa* Morr. — Swift Current, Cutknife and Harlan (ne of Lloydminster) (CNC).

Voluble Dart — *Agrotis volubilis* Harv. — s Sask., n to Love and Ile-a-la-Crosse.

Oblique Dart — *Agrotis obliqua* (Sm.) — s Sask., n to Aylsham.

Dark Sword Grass — *Agrotis ipsilon* (Hufn.) — s Sask., n to Aylsham.

Riley's Dart — *Onychagrotis rileyana* (Morr.) — Swift Current (DA, Saskatoon), Saskatoon (CNC).

Gothic Dart — *Feltia jaculifera* (Gn.) — s Sask., n to Aylsham and Snowden.

Hudson's Dart — *Feltia hudsoni* Sm. — Swift Current (CNC).

Dingy Cutworm — *Feltia subgothica* (Haw.) — Cypress Hills (West Block).

Master Dart — *Feltia herilis* (Grt.) — s Sask., n to Aylsham.

The Grand Copablepharon — *Copablepharon grande* (Stkr.) — s Sask.,

n to Saskatoon.

The Gray Copablepharon — *Copablepharon viridisparsum* Dod. — sw Sask., e to Caron and Rockglen; n to Waskesiu.

The Brown Copablepharon — *Copablepharon longipenne* Grt. — s Sask., n to Saskatoon and Rutland (nw of Unity).

Divergent Dart — *Euxoa divergens* (Wlk.) — s Sask., n to Cumberland House.

Reaper Dart — *Euxoa messoria* (Harr.) — s Sask., n to Aylsham.

Climbing Dart — *Euxoa scandens* (Riley) — s Sask., n to Aylsham and Loon Lake.

Golden Dart — *Euxoa aurulenta* (Sm.) — Aylsham, Saskatoon and Portreeve.

The Three-marked Dart — *Euxoa tristicula* (Morr.) — s Sask., n to Shoal Lake and Harlan (ne of Lloydminster).

Pleuritica Dart — *Euxoa pleuritica* (Grt.) — s Sask., n to Aylsham



Gothic Dart (Feltia jaculifera (Gn.))

Keith Roney

(CNC) (DA, Saskatoon)

Pestula Dart — *Euxoa pestula* Sm.
— s Sask., n to Aylsham (CNC) (DA, Saskatoon).

Simon Dart — *Euxoa simona* McD.
— reported for Saskatchewan by H. McDonald.

Sordid Dart — *Euxoa lidia thanatologia* (Dyar) — s Sask., n to Aylsham.

Army Cutworm — *Euxoa auxiliaris* (Grt.) — s Sask., n to Aylsham and Prince Albert.

Ruddy Dart — *Euxoa mimallonis* (Grt.) — s Sask., n to Norquay and Prince Albert.

Olivia Dart — *Euxoa olivia* (Morr.) — s Sask., n to Aylsham.

Tippling Dart — *Euxoa intrita* (Morr.) — Maryfield, Shoal Lake, Aylsham and Saskatoon.

Clear Dart — *Euxoa declarata* (Wlk.) — s Sask., n to Aylsham and Battlefords Provincial Park.

Flat Dart — *Euxoa campestris* (Grt.) — s Sask., n to La Ronge.

Foamy Dart — *Euxoa spumata* McD. — reported by J.D. LaFontaine for the Swift Current area and the Moose Jaw area.

The Pale Dart — *Euxoa pallipennis* (Sm.) — Buffalo Pound Provincial Park, Coronach and Swift Current.

Misturata Dart — *Euxoa misturata* (Sm.) — reported for sw Sask. by J. D. LaFontaine (Maple Creek and Val Marie areas).

The Utah Dart — *Euxoa cinereopalida* (Sm.) — Eastend (CNC).

Spineless Dart — *Euxoa mitis* (Sm.) — Eastend and Swift Current (CNC).

Acornis Dart — *Euxoa aequalis acornis* (Sm.) — s Sask., n to Punichy and Duck Lake.

Hairy Dart — *Euxoa comosa* (Morr.) — s Sask., n to Fort Esperance (e of Tantallon), Punichy and Saskatoon.

Variable Dart — *Euxoa infausta* (Wlk.) — Oxbow.

Pale-based Dart — *Euxoa basalis* (Grt.) — s Sask., n to Aylsham.



The Grand Copablepharon (*Copablepharon grande* (Stkr.))

Keith Roney

Red Backed Cutworm — *Euxoa ochrogaster* (Gn.) — s Sask., n to Aylsham and MacDowall.

Plaited Dart — *Euxoa plagigera* (Morr.) — s Sask., n to Aylsham.

Tesselate Dart — *Euxoa tessellata* (Harr.) — throughout Sask.

White-winged Dart — *Euxoa albipennis* (Grt.) — s Sask., n to Aylsham and Duck Lake.

Chain-dotted Dart — *Euxoa catenula* (Grt.) — s Sask., n to Fort Qu'Appelle and Buffalo Pound Provincial Park.

Median-banded Dart — *Euxoa medialis* (Sm.) — Swift Current (CNC).

Elegant Dart — *Euxoa perexcellens* (Grt.) — Melfort (DA, Saskatoon).

Obelisk Dart — *Euxoa obeliscoides* (Gn.) — s Sask., n to Fort Qu'Appelle and Saskatoon.

Oberfoell's Dart — *Euxoa oberfoelli* Hdwk. — Scout Lake (CNC).

Choris Dart — *Euxoa choris* (Harv.) — DA, Saskatoon.

White-underwing Dart — *Euxoa brevipennis* (Sm.) — Saskatoon (National Research Council collection), Swift Current (DA).

Chestnut Brown Dart — *Euxoa castanea* (LaFontaine) — s Sask., n to Aylsham.

Idaho Dart — *Euxoa idahoensis* (Grt.) — sw Sask., n to Saskatoon, e to Fort Qu'Appelle.

Closed Dart — *Euxoa clausa* McD. — Swift Current and Willow Bunch areas (reported by J. D. LaFontaine).

Lactificans Dart — *Euxoa lactificans* (Sm.) — Elbow area, Cypress Hills area and Shaunavon area (reported by J. D. LaFontaine).

Four-toothed Dart — *Euxoa quadridentata* (G. & R.) — s Sask., n to Red Earth and Prince Albert area.

White-lined Dart — *Euxoa niveilinea* (Grt.) — Regina and Gull Lake (reported by J. D. LaFontaine).

Olivalis Dart — *Euxoa olivalis* (Grt.) — Killdeer and Val Marie.

Oblong Dart — *Euxoa oblongistigma*



Army Cutworm (*Euxoa auxiliaris* (Grt.))

Keith Roney

(Sm.) — sw Sask., n to Swift Current area and e. to Val Marie area (reported by J. D. LaFontaine).

Dargo Dart — *Euxoa dargo* (Stkr.) — s Sask., n to Aylsham and North Battleford area (CNC).

Saskatoon Dart — *Euxoa unica* McD. — Saskatoon (CNC).

Rubbed Dart — *Euxoa detersa* (Wlk.) — s Sask., n to La Ronge.

Scared Dart — *Euxoa cicatricosa* (G. & R.) — s Sask. n to Aylsham (CNC).

Tronella Dart — *Euxoa tronella* (Sm.) — Buffalo Pound Provincial

Park, Swift Current area and Shaunavon area.

Teleboa Dart — *Euxoa teleboa* (Sm.) — s Sask., n to Indian Head area and Saskatoon area (reported by J. D. LaFontaine).

Difformis Dart — *Euxoa difformis* (Sm.) — Saskatoon (National Research Council collection).

Mourning Dart — *Euxoa moerens* (Grt.) — Fort Qu'Appelle, Sask. Landing Provincial Park and Shaunavon area.

Dod's Dart — *Euxoa dodi* McD. — s

Sask., n to Buffalo Pound Provincial Park area and Lancer area (reported by J. D. LaFontaine).

Broken Dart — *Euxoa infracta* (Morr.) — Killdeer area (reported by J. D. LaFontaine).

Fillet Dart — *Euxoa redimicula* (Morr.) — Aylsham and Cypress Hills (CNC).

Auripennis Dart — *Euxoa auripennis* LaFontaine — s Sask., n to Nipawin area.

Servita Dart — *Euxoa servita* (Sm.) — s Sask., n to Somme and Waskesiu area.

Munis Dart — *Euxoa munis* (Grt.) — Canora, Lestock, Punnichy, Quinton and Fort Qu'Appelle.

Regina Dart — *Euxoa taura* Sm. (= *E. cooki*) — Regina (Type Locality), Swift Current and Killdeer.

Perolivalis Dart — *Euxoa perolivalis* (Sm.) — s Sask., n to Aylsham.

Ridings' Dart — *Euxoa ridingsiana* (Grt.) — s Sask., n to Aylsham.

Maimes Dart — *Euxoa maimes* (Sm.) — s Sask., n to Wadena and Tramping Lake Regional Park.

Manitoba Dart — *Euxoa manitobana*

McD. — s Sask., n to Saskatoon.

Yellow-lined Dart — *Euxoa flavicollis* (Sm.) — s Sask., n to Aylsham and Duck Lake.

Unmarked Ruddy Dart — *Euxoa perpolita* (Morr.) — s Sask., n to Aylsham.

Expected Species

Tricosa Dart — *Feltia tricosa* (Lint.) — w to Brandon, Manitoba (CNC).

Quebec Dart — *Euxoas quebecensis* (Sm.) — across Canada, but missed in Manitoba and Saskatchewan.

Cona Dart — *Euxoa cona* (Stkr.) — n to Malta, Montana and w North Dakota.

Nostra Dart — *Euxoa nostra* (Sm.) — n to s British Columbia and s Alberta, with a disjunct population at Fort Smith, N.W.T.

Fleece-winged Dart — *Euxoa velleripennis* (Grt.) — w to Cartwright, Manitoba and se Montana.

Holleman's Dart — *Euxoa hollemani* (Grt.) (= *E. andera*) — Arizona, n to British Columbia and Malta, Montana.

Lemon-coloured Dart — *Euxoa citricolor* (Grt.) — n to Badlands of North Dakota and Alberta.

Wandering Dart — *Euxoa aberrans* (McD.) — s British Columbia and s Alberta, e to s Manitoba and Michigan, but missed so far in Saskatchewan.

References

BYERS, J.R., D.L. STRUBLE, and J.D. LAFONTAINE. 1966. Biosystematics of the genus *Euxoa* (Lepidoptera: Noctuidae) XVIII. Comparative biology and experimental taxonomy of the sibling species *Euxoa ridingsiana* (Grt.) and

Euxoa maimes (Sm.). *Can. Ent.* 117: 481-493.

HARDWICK, D.F. 1970. The genus *Euxoa* (Lepidoptera:Noctuidae) in North America 1. Subgenera *Orsagrotis*, *Longivesica*, *Chorizagrotis*, *Pleonectopoda* and *Grassivessica*. *Mem. Ent. Soc. Can.* 67:1-177, figs. 1-326.

HODGES, R.W. (editor). 1983. Check list of the Lepidoptera of America North of Mexico. E.W. Classey, and the Wedge Entomological Research Foundation, London, England. 284 pp.

LAFONTAINE, J.D. 1974. The *punctigera* group of the genus *Euxoa* (Lepidoptera: Noctuidae), with descriptions of two new species. *Can. Ent.* 106:1233-1240.

—— 1975. The *misturata* group of the genus *Euxoa* (Lepidoptera:Noctuidae), with a description of a new species. *Can. Ent.* 107:1327-1332.

—— 1976a. A synopsis of the *aequalis* group of the genus *Euxoa* Hbn. (Lepidoptera: Noctuidae) with a description of a new species from southwestern United States. *Can. Ent.* 108: 741-750.

—— 1976b. A new species of *Euxoa* (Lepidoptera: Noctuidae) allied to *Euxoa olivia* and *Euxoa septentrionalis*. *Can. Ent.* 108:1275-1280.

—— 1987. The moths of America North of Mexico, Fascicle 27.2, Noctuoidea, Noctuidae (Part), Noctuinae (Part-*Euxoa*). The Wedge Entomological Research Foundation, Washington, D.C. 237 pp.

LAFONTAINE, J.D., and J.R. BYERS. 1982. A revision of the *comosa* group of the genus *Euxoa* Hbn. (Lepidoptera: Noctuidae), with descriptions of two new species. *Can. Ent.* 114:575-589.

MCDUNNOUGH, J. 1932. Notes on *Agrotid* genera with description of a new species. *Can. Ent.* 64:104-112.

—— 1932. Notes on the synonymy of certain *Euxoa* species with descriptions of new species. *Can. Ent.* 64:229-236.

NINE WHOOPING CRANES

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A few years ago, on the front page of the local newspaper, there was a picture of several Whooping Cranes. The photo credits were given to the Museum of Natural History. I phoned the museum and got the location of the cranes.

My teenage son and I travelled to the general area where the cranes should be. We were fortunate to spot three of them flying overhead. There were two adults and one juvenile. We followed them in the car as they flew south, thinking that this would be the first and last we would see of them as they migrated south. We were lucky to have seen our first Whooping Cranes. If we had been a few minutes later we would have missed them.

But wait ... they turn west and land in a stubble field about a quarter of a mile away. We take a couple of pictures of them and they fly over a low hill. We follow them and much to our surprise we see nine Whooping Cranes. This is our lucky day! Here are about 14 percent of the world's population of wild Whooping Cranes right before our eyes. The cranes are wading in a large slough. There appear to be three family groups, six adults and three juveniles. We use an old fallen down grain bin as a blind. It is about 400 feet from the slough. We take several pictures of the cranes. The light is fading. We will come back tomorrow and build a blind at the edge of the slough and

get some better pictures.

On arriving back at the slough the next morning, we can see the cranes about a mile away feeding in the stubble. Walking down to the slough, we see a pile of telephone pole cross arms. These would make a nice base for our blind. We make several trips carrying these cross arms to the slough. The blind is finished. All we have to do is wait for the cranes to come back.

BANG! BANG! BANG! DUCK HUNTERS!!

We look to where the cranes are. They are flying. Well, that is the last we will see of those Whooping Cranes. We take the blind apart and carry the cross arms back and are just coming back to pick up the cameras when FLAP! FLAP! FLAP! We look up ... the cranes are right overhead. We drop to the ground, trying to make ourselves small and inconspicuous. This is near impossible for six-foot men to do! The cranes land right in front of where the blind had been. We are about 100 feet away. I am sure that they know that we are there. They do a bit of dance for us as we take pictures. They then fly about a quarter of a mile away and start to feed in the stubble field.

We go to the edge of the slough and hide in the bullrushes. We can see the entire slough. The cranes return to the slough after about a half



Whooping Cranes near Regina.

Keith Barr

hour. We take pictures and watch them for a couple of hours.

We notice a small yellow car approach the slough at the far end. Two hunters get out with their guns and approach the slough. The only things on the slough are one coot and the nine Whooping Cranes. The hunters get back into the car and drive to the area where the cranes are. They are on the opposite side of the slough from us. They stop the car and get out with their shotguns. They carry their guns across their chests. They want action and are ready for it. They approach the cranes. My God, what do we do? Jump up and scare the cranes? No, if we do that, they might fly right over the hunters. Should we just yell? I don't know what to do. The cranes see the hunters approaching, so they regally walk for a short distance and take flight. The hunters do not raise their guns. Do they finally realize

what these magnificent birds are? I hope this is the reason. The hunters return to their car and drive away. My son and I run back to our car, which is about half a mile away. We go in search of the hunters but cannot find them.

A somewhat more amusing incident happened to this same group of Whooping Cranes. I do not recall who told me about this incident, but he was sitting in his car watching the cranes on the slough when he noticed a car racing towards the slough. As the car draws near, the cranes lift off. The driver of the car slams on the brakes, jumps with what appears to be a Brownie Hawkeye camera and takes a picture of the departing cranes.

I guess this is the method you have to use if you don't have a telephoto lens!

SUMMER AND BREEDING RECORDS OF THE WHOOPING CRANE IN SASKATCHEWAN

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Saskatchewan lies near the centre of the former Canadian breeding range of the endangered Whooping Crane. The Canadian Whooping Crane Recovery plan calls for establishment of a second migratory flock of Whooping Cranes breeding in Canada. Experience with reintroductions of other wildlife suggests the probability of success will be increased if this reintroduction occurs near the centre of the previous range.¹⁷ Understanding the former breeding range may therefore help to choose the general area for a reintroduction attempt. Even though the ecology of many sites has changed during the past 70 years, previous occupation by Whooping Cranes is one important clue to what constitutes suitability of a breeding site.

Allen concluded the biotic niche of the Whooping Crane was a shallow water region of ponds and sloughs, cattail, sedges, bulrush, pondweeds, spikerush and similar aquatic plants.¹ For Saskatchewan, he listed seven known historic breeding records and concluded that these cranes nested in the aspen parkland belt and in the transition zone between parkland and grassland.¹ No nest records were found for the forest or short grass prairie biomes in our province.¹ Macoun suggested a wider distribution: "Thirty years ago this species was found in all the large marshes from the Red River to the Rocky mountains."²⁷

In this review I evaluate breeding and summer records for the Whooping Crane in Saskatchewan. I include additional breeding sites not reported by Allen to provide a more complete understanding of the crane's historic distribution, abundance and habitat selection in Saskatchewan.¹ This information may help in selection of eventual sites for a reintroduction attempt.

I also correct the location of the "famous last nest" found by Bradshaw in 1922, incorrectly reported as Muddy Lake by Allen.¹

Methods Primary sources for this review were Allen's monograph, other published literature and Saskatchewan Museum of Natural History (SMNH) files of mostly unpublished observations which cover the period 1893 to 1976.¹ These reports reflect the work of Fred Bradshaw, Fred Bard and other museum staff in tracking down observations of Whooping Cranes. Museum staff solicited reports from the public and recorded observations with as much detail as possible in reports carefully filed by year. Some of the reports are on special Whooping Crane Survey Report (WCSR) forms. Letters and other documents in the file have been cited in full with SMNH indicating their location. These files are now stored at the Canadian Wildlife Service (CWS) office in Saskatoon.



Coming in for a landing.

Lorne Scott

Since 1977 the Canadian Wildlife Service has compiled all sighting reports of the Whooping Cranes and classified them as accepted or unconfirmed.³⁸ Only accepted records from this period have been included in this paper.

The records located fall into three categories: known breeding records (reference to a nest with eggs or a flightless chick or reported as a breeding record by an ornithologist), suspected breeding records, and summer records with no evidence of breeding. Summer records are defined as observations between 1 June and 20 August, which exclude the latest spring migrants and the earliest fall migrants (Brian Johns, pers. comm.). Nesting Whooping Cranes would have been sitting on eggs during May while nonbreeders are still in migration, so these May dates may have included some true

summer observations.

Results All records are mapped on Figure 1. Numbers on the map match the numbered records in the text.

Known Breeding Records:

1. In May 1827, Richardson wrote that the Whooping Crane "frequents every part of the fur countries, though not in such numbers as the brown crane ... Its eggs are nearly as big as those of the swan, and of a bluish-white colour, with patches of brown."²⁰ Richardson shot a Whooping Crane at Carlton, 7 May 1827, and this record is plotted there, but his observations of breeding birds may have been at one or several points during his travels.

2A. Macoun reported Whooping and Sandhill Cranes breeding in the

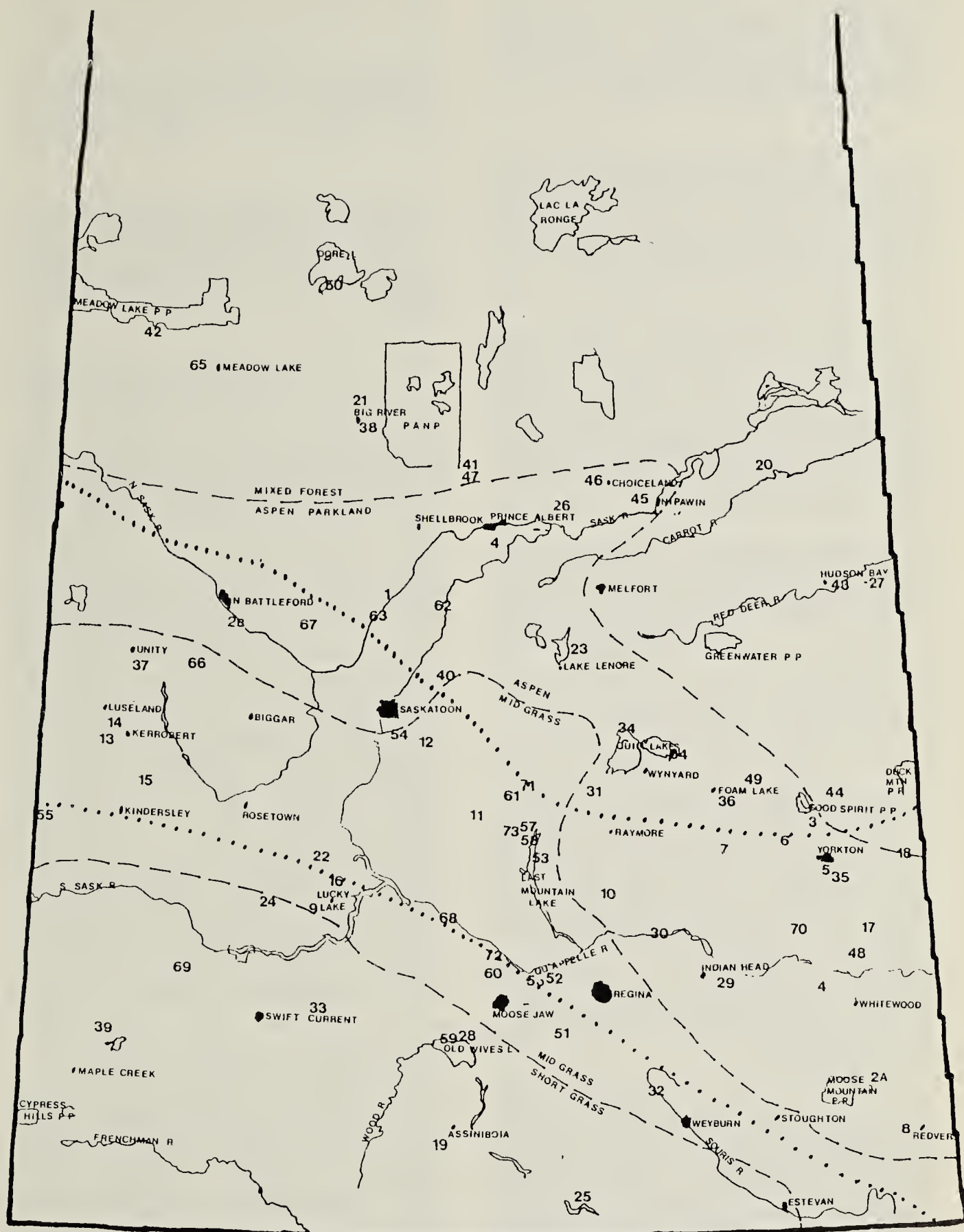


Figure 1. BREEDING, PROBABLE BREEDING AND SUMMER RECORDS OF THE WHOOPING CRANE IN SASKATCHEWAN, MAPPED WITH THE BREEDING RANGE AS MAPPED BY ALLEN AND VEGETATION ZONES.^{1,36}

Legend

- 1-16 Known Breeding Records
- 17-28 Suspected Breeding Records
- 29-73 Summer Records
- Boundaries of Vegetation Zones
- Breeding Range After Allen (1952)

marshes east of Moose Mountain 1 July 1880.^{24,25} These marshes would have been northeast of the Moose Mountain, probably near the present towns of Wawota or Dumas.

2B. Raine reported a nest with two eggs found by MacDonald near Battleford in 1884. The nest was described as a flat mass of rushes and grass about 3 ft. in diameter.³⁴

3. About 1955, William Fernie told Cliff Shaw that in the 1890s he had seen a Whooping Crane nest with two white eggs on top of a muskrat house on Battersby's Lake (25-28-5-W2), 6 mi. west of Gorlitz.¹⁹

4. Hugh Richardson collected a set of two eggs south of Prince Albert on 10 June 1896. The nest was a pile of marsh hay on the open prairie.²⁷ This set of eggs is now in the New York State Museum, Albany, New York.¹

5. On 16 May 1900, two eggs were collected near Yorkton by Cowboy Brown.^{1,10} This apparently is the egg set illustrated and described by Reed.³⁵ These eggs are now in the Museum of Comparative Zoology at Harvard University, Cambridge, Mass. The nest was described as a mass of marsh hay on the prairie 3 ft. in diameter.¹⁹

6. Peter Fernie told Stuart Houston that one year near 1900, a pair resided all summer in the "Ferne meadow" where a ridge runs into a big marsh adjacent to Cussed Creek, 4 mi. west and 1 mi. south of the village of Springside on NE7-27-6-W2. They laid a single large dirty white egg on a muskrat house. Fernie had also found two Sandhill Crane nests in the same meadow (¹⁹; C.S. Houston to Dale Hjertaas 27 January 1990).

7. A set of eggs was collected by Edward Arnold on 21 May 1901, at the foot of the Beaver Hills. This set is now in the collection of the Western Foundation of Vertebrate Zoology in Los Angeles (C. Stuart Houston, pers. comm.).

8. Harold H. Pittman was told in 1912 of a Whooping Crane nest at a large slough near Wauchope about 1902.³³

9. Ernest J. Demaine and Fred Swann found a nest in 1907, when establishing their homesteads near the present hamlet of Demaine. The area at this time was all virgin prairie. They had observed the pair of cranes make daily trips south and back again. Later in the spring only one of the birds made this trip. The two men decided one day to follow this bird north to where they believed it landed. About 2 mi. from their starting point they were met by a Whooping Crane which appeared wounded. They chased it for a considerable distance before it took to wing. The crane successfully lured the men away with its broken wing display on a second day as well. On the third day they realized the trick and went in the opposite direction to that in which the crane tried to lead them. They located a nest in a slough in 1 ft. of water and some distance off shore. The other Whooping Crane was on the nest, but left as they waded out toward it, exposing two eggs (Dave Santy to Fred Bard, 24 April 1954 and 18 Sept 1954, SMNH).

Santy's letter indicates the cranes abandoned the nest as they did not see them again. However Bradshaw had recorded that only one egg hatched, and the chick was taken by Demaine, but apparently died the next day.⁹ Demaine also told

Bradshaw about his unsuccessful attempts to trap and shoot these cranes.

The cranes did not return the following year and the slough was drained some years later.

10. H.M. Dahl of Davidson found a pair of adult Whooping Cranes with two young about the last week of June 1911, north of Southey (Tp. 24-18-W2). He noted that there was then no farm within 2 mi. of the nest site (Bradshaw, undated).

11. In 1911, Reuben Lloyd of Davidson found a nest containing two eggs 20 mi. north of that town.^{1,29}

12. Lester G. Moore observed a nest near Bradwell in 1912. One of the adult birds was killed.¹

13. Finley reported that his grandfather, J.V. Finley, and Joe Perry shot two and wounded one Whooping Crane in the fall of 1921 at Buffalo Coulee, 15 mi. due south of Luse-land.¹² They were later informed by an angry farmer near Buffalo Coulee that adult Whooping Cranes had nested there every year prior to 1921 and had raised a golden-coloured young one.

14. A series of Whooping Crane nest records come from Shallow Lake (Tp. 25-24-W3) between 1911 and 1928. Bradshaw called this lake, 9 miles northwest of Kerrobert, Baliol Lake, but I have used the current name of Shallow Lake.⁹ According to Archie Smith of Kerrobert, there were about 12 Whooping Cranes nesting there in 1911. Shallow Lake was then an alkaline marsh covering about 2000 acres. In 1912, Smith secured a young bird which became a family pet. It was killed by a coyote near their home in the fall.⁹

W.W. Smith, Archie's brother, found a nest there in 1921. There were two eggs, only one of which hatched (Bradshaw, undated). Bradshaw indicated this was the only pair in 1921 and the cranes raised one young.⁸

On 19 May 1922, Neil Gilmour, a provincial game guardian from Moose Jaw, observed a nest with two eggs at the same lake.^{1,6,29} Gilmour's search for these cranes and their nest is reported in detail in Bent.⁵ He described the marsh as covering 3000 acres with a maximum depth of 3 ft. and grass growing to 2 ft. above the water. The nest, a mound of coarse grass and reeds rising one foot above the water, was in the centre of an open water area about 30 ft. in diameter. Four birds returned in 1923 and Gilmour saw a pair on 4 June 1925.⁹

Hoyes Lloyd observed three birds here on 30 September 1922, and secured valuable natural history notes on their occurrence there for the previous 12 years. He noted that one of the birds he saw was a young of the year and referred to nests found there by Gilmour in 1922 and Smith in 1921; both were reported to have left the nests alone. He also reported that two were shot in the previous year (1921) and one was shot two years previously (1920). Local residents indicated there had been as many as 10-11 Whooping Cranes at this marsh in past years and were still eight three years ago (1919) (2 October 1922 report from Hoyes Lloyd, in camp, Plenty, SK, to the Commissioner. Cited in confidential file sent with a letter by J. B. Harkin, Commissioner, Dept. of the Interior, National Parks of Canada, to J.D. Soper, 23 November 1934).

This flock gradually decreased in numbers. The last reported nesting

was observed in 1928 and reported by Archibald Smith in a 17 May 1932, letter to Bradshaw (SMNH). Bradshaw indicated that whoopers visited Shallow Lake in 1929, but there were none present in 1930.⁷ The marsh was practically dried out in 1928 and had not reflooded by 1934.⁹ This drought probably contributed to the crane's disappearance from the site. However, Lloyd's report of several shootings indicates that persecution also contributed to the decline.

Allen reported an observation by E. Margaret Estlin near Kerrobert in the summer of 1913.¹ Pearson is cited as the source for this record.³² He reported that Estlin sent him a photograph of a living immature Whooping Crane from northern Saskatchewan "a few years ago." Presumably, Allen contacted Estlin to determine that this observation was from the Kerrobert area in 1913. As Kerrobert is only 9 mi. away, this record may also be from Shallow Lake.

15. A little more than 30 mi. south-east of Shallow Lake lies another shallow prairie marsh, Kiyiu (Eagle) Lake. I have used the name Eagle Lake in direct quotes, but otherwise use the modern Kiyiu Lake. The two are synonymous, since Kiyiu is one of the Cree names for eagle. Bradshaw reports finding a Whooping Crane nest here in 1922.⁹

"P. Hettle, Brock, reported in 1922 that for several years a small flock of Whooping Cranes had nested at Eagle Lake, Tp. 30-21-W3. The writer visited this lake May 28, 1922, where three birds were observed and one nest containing three eggs was found. One young hatched May 30. One egg was infertile."

Bradshaw collected the hatched

young and both eggs, one of which was infertile. The two eggs and some nest material recorded as collected by Bradshaw at Eagle Lake on 28 May 1922, are in the collection of the Saskatchewan Museum of Natural History. One egg has a small hole for removing contents, the other a larger cut consistent with one addled and one fertile egg (Dr. Paul James, Curator of Ornithology, SMNH, pers. comm.). Interestingly, Bradshaw reports accession of only one egg (addled).⁶

Whooping Cranes appear to have persisted at Kiyiu Lake until it dried out in 1930. Bradshaw (1930) wrote "On May 20 (1930) I was out to Eagle Lake, north of Neitherhill, where I found the Whooping Crane nesting site in 1922." The lake was dry, but Mr. Scholey of Neitherhill informed him there was water in the lake in 1929 and Whooping Cranes had bred there. David Watson of Dodsland, who lived near Kiyiu Lake, reported in 1932 that no Whooping Cranes had been seen or heard for two or three years and that the marsh was completely dried out.⁹

This 1922 nest record, which became famous as the "last nest," was somehow misplaced from Kiyiu to Muddy Lake and has been cited as a Muddy Lake nest record ever since. This error is first published in Allen (p. 61): "358. Muddy Lake (7 mi. S. of Unity); May 28-June 1 1922 (nesting 1 egg and 1 yg. coll.); Fred Bradshaw; Bent (1926); Fleming Coll. No. 30393 (ROMZ)".¹ Allen also refers to this record at Muddy Lake on pages 24 and 39, listing it as the last known nesting site, the Wood Buffalo breeding area not having been discovered by 1952.¹

The location of this Whooping Crane nest at Kiyiu, not Muddy, Lake, is

confirmed by Bradshaw's account of the discovery. He does not name the lake but indicates he walked to it from a farmhouse southwest of the Village of Plenty.⁸ Plenty is indeed just northeast of Kiyiu Lake. The record matches except that the chick is reported as hatching Monday, 29 May, rather than 28 May. Bradshaw has his dates one day off in this article, placing Sunday on 29 May rather than the actual 28 May. Otherwise this record matches the report in Bent of the nest being found 28 May and one egg hatched the next day.⁵

While Allen was the first to publish Muddy Lake as the location, he presumably received inaccurate information from some source.¹ It is possible he followed the lead of Mitchell who wrote, "It is deemed advisable for the present to withhold exact locality of these breeding grounds," and deliberately falsified the location.²⁹ However Allen correctly cites the location of the nest at Shallow Lake, also found in 1922, so it is unlikely that he falsified the location of the nearby Kiyiu nest to protect the most recent breeding site.¹ It seems probable that Allen located the "last nest" at the wrong lake through an honest error.¹

One of Allen's sources, Bent,⁵ does include a quote from Bradshaw describing the nest as a mound of sedges, gathered from around the nest, 4 to 5 ft. in diameter, and rising 15 to 18 in. above the water, and located 28 May 1922, but does not give a nest location.

Allen also cites a specimen at the Royal Ontario Museum (ROM). This may be the source of the error. ROM records for Whooping Crane chick #37218 indicate it was collected 1 June 1922, when four days old, hav-

ing hatched 28 May. It was collected at Kiyiu Lake (51° 37' N, 108° 52' W) from a nest with two other eggs — one of which was addled. The chick came to ROM as part of the J. H. Fleming collection. A note on the specimen card says "Report of the chief game guardian of Sask., Regina 1923, p. 14 refers to this specimen, and photo of nest on p. 15" (Letter Ross D. James, Associate Curator of Ornithology, ROM, to DGH, 19 April 1988). The cited report describes the nest with three eggs but does not provide a location.⁶

How this Whooping Crane chick went from Bradshaw's collection at Kiyiu Lake to ROM is not clear, except that it was via the Fleming Collection. The original label, apparently in Mitchell's handwriting, reads:

"*Grus americana*, Hatched June 1, 1922. — 2 other eggs in nest, 1 addled. Chick kept alive 4 days, not sexed. Loc: Muddy Lake, 7 mi. S. of Unity-W. of Saskatoon, Sask." (Brian Johns, CWS, to DGH 19 December 1988, and Ross James, ROM, to DGH 3 December 1992.)

Ross James (letter to DGH 3 December 1992) indicates a second label attached to the bird was added by J.L. Baillie, former curatorial assistant at ROM. The label reads:

"Letter to L.L. Snyder from F. Bradshaw, the collector, dated 6 June 1955, says this bird was not taken near Unity but at Eagle L (Kiyiu L.) south of Plenty (50 mi. SSE of Unity)."

(L.L. Snyder was formerly a curator and Department Head at ROM.)

This label, on the specimen Allen references, is the probable source of

the error. Bradshaw wrote to correct the error only after Allen's monograph was published in 1952.

Whether the error originated with Mitchell, or somewhere between him and Bradshaw, the mistake stuck. O. S. Pettingill, Jr., during his search for the Whooping Crane nest areas in 1946, visited the "last known nest site at Muddy Lake" with Bob Smith of the US Fish and Wildlife Service.²⁸ Bard, Roy, Lahrman, and Godfrey have also cited Muddy Lake as the breeding locality.^{3,37,23,16}

16. Luck Lake Heritage Marsh, restored in 1988, also apparently supported Whooping Cranes with nesting reported until 1929 and summering reports for 1932, 1935 and 1990. Luck Lake is 6 mi. north of the town of Lucky Lake. In notes the names seem to be used interchangeably, for example Bradshaw refers to Lucky Lake, 5 mi. NE of the town of that name, clearly the marsh we now call Luck Lake.⁷ I conclude that all reports referring to Luck Lake or Lucky Lake refer to what is now Luck Lake Heritage Marsh.

Bradshaw includes the following statement from Frank Miller of Birsay.⁹ "For six years prior to 1930, from 2 to 7 were observed each year. Four were seen on the spring of 1929 and two young were hatched. The young are of a tan colour but look white when they fly. The only time one sees the black wing tips is when the birds are flying."

Roy (1954) cites a letter from Steve West (8 May 1964) indicating that Whooping Cranes nested for several years in the 1920s near Luck Lake.³⁷ In spring there were never more than two adults together, but he saw four white and three buffy ones in August of 1929, even observing that two

adults put a coyote to rout while the other two adults guarded the buff ones. He observed them again during the first week in October when the buffy young looked to be as big and strong as the parents. He never saw them in any subsequent year.

A confidential file attached to 23 November 1934, letter J.B. Harkin to J.D. Soper, cites a 23 February 1927 letter from Bradshaw indicating Neil Gilmour observed one pair at Lucky Lake on 10 June (presumably 1926) and one pair the previous year. Gilmour reports that in May 1925 he observed two pairs.¹⁴ "After carefully observing the actions of one pair of cranes through field glasses for almost an hour, I had no doubt from their constant movement forth and back over a very circumscribed area that they were engaged in the arduous task of nest building." Gilmore does not give a location, but the previous reference almost certainly places the observation at Luck Lake.

In the same file Reuben Lloyd of Davidson reported Whooping Cranes nesting at Lucky Lake in 1926 and, perhaps, 1927.

Bradshaw saw one Whooping Crane at Luck Lake 15, 27 and 28 May 1930. He watched it for some time, but saw no evidence that it was breeding, and concluded that it was a lone bird.⁷

Emil Lestin of Birsay, SK, reported observing two Whooping Cranes on stubble and marsh 12 August 1935. "The lake north of Luck Lake is dry, the Whooping Cranes are staying at the spring. I think they have young, but I am not sure" (WCSR, 1935, Emil Lestin).

The next summer Whooping Crane record for Luck Lake is of a yearling

observed there 15 May to 22 June 1990. This crane was observed by many visitors during the official dedication of Luck Lake as a Heritage Marsh. It moved to NE17-14-2-W3 for 10 to 26 July (Brian Johns to DGH, 6 January 1993).

Suspected Breeding Records

17. E. H. M. Knowles of Regina reported Whooping Cranes nesting along Cut Arm Creek, 2.5 mi. west and 1 mile south of Bredenbury on 29-22-1-W2 in 1893.⁹

18. G. H. E. Mapleton of Shillingthorpe, a rural post office located on the northeast side of Shillingthorpe Lake, reported first seeing Whooping Cranes in 1894 when three pair stopped and bred on 11-26-31-W1. In 1895, two pairs stayed all summer. The next year (1896) only three birds were seen. They left after about a week because much of the marsh had dried up. E.H.M. Knowles also reported Whooping Cranes nesting on Shillingthorpe Lake on 8-26-31-W1 in 1895.⁹ Section 8 is 1 mi. from Shillingthorpe Lake proper, but the topographic map shows two marshes of about 40 and 100 acres on this section.

19. Macoun reported Whooping Cranes likely breeding at Twelve Mile Lake, Wood Mountain, on 6 June 1895.²⁷

20. Silas Head recalled that there once were quite a few Whooping Cranes near Red Earth.³⁰ He remembered that his grandfather had seen lots of these birds out on the prairie before the white men came. Silas reported that when he was young (he was born about 1902) there were still a few Whooping Cranes near Kennedy Creek and remembered one hunter finding a pair

and locating a nest. "It was not a very good nest, just a few sticks on the ground in the swamp." The nest held three eggs which were taken and eaten.

While the description does not sound like the large mound of grass described for other nesting Whooping Cranes, Head was remembering a nest he apparently did not see himself. The observation was when he was young and before a forest fire in the 1930s, so may indicate a population of Whooping Cranes still present and breeding at Red Earth in the 1920s.

R.A. Hutton of Red Earth wrote to Bard (13 August 1945, SMNH) stating that older Indians are familiar with the white crane. It used to be quite numerous eight or ten years since. He indicated one man from Pine Bluff had seen one about five years ago, the last observation.

21. In the spring of 1916, H. Sharpe of Dore Lake and Big River saw two Whooping Cranes and also observed a nest from a distance. No details are given of the presumed nest. Sharpe also found a dead Whooping Crane in June 1916 on Black Duck Creek about 25 mi. north of Big River.⁹

22. "Ernie Hedger (now of 1310 Colony Street, Saskatoon) recalls that his parents, about the years 1915-16, used to speak of 'the big white birds' that frequented the hay slough on the west side of Section 2, Tp. 26-10-W3. He remembers seeing the birds and their young during the summer months. The cranes also spent some time in the sloughs on the adjoining Sections, 3 and 10, 10 mi. south and 5 mi. east of Dinsmore".³⁷

23. N. T. Kingsley told P.A. Taverner and Hoyes Lloyd on 27 August 1920, in Humboldt, that Whooping Cranes nested on a small lake just east of Lake Lenore. These birds were seen there by himself the previous 8 October (1919) and were reported at the same place again this season (note from P. A. Taverner to Bradshaw, SMNH).

24. On 1 June 1922, J.M.W. Bavin of the former rural post office of High Point, 4 mi. east and 10 mi. north of Kyle, Tp. 23-14-W3, wrote to the museum saying that a pair of Whooping Cranes used to nest in this district but the previous year (1921) they did not return.⁹

25. R. Appleby of Roan Mine, SK, 10 mi. west and 2 mi. north of Minton, reported that a pair had nested on 20-3-21-W2 for four years (WCSR, 1930, R. Appleby). Bradshaw wrote to Appleby 29 October 1930, asking for more details, but apparently did not receive a reply.

26. Andrew Wytoski, a farmer from Strong Pine, reported Whooping Cranes breeding on SE11 and 12-51-22-W2 near the White Fox River and 5 mi. south of Foxford. His spring and fall counts for 1927, 1928 and 1929 were 2 and 5, 4 and 9, and, 8 and 16, respectively (Whooping Crane Information, a 1932 file note SMNH). He clearly gives this as a breeding location, but there are no comments on eggs or young so it is possible he was reporting spring and fall migrants.

27. C.S. Van Tuyll, of Armit, then called Meeks Siding, reported Whooping Cranes nesting in a marshy meadow 2 mi. long, lying 5 mi. east of Roscoe, apparently in 1932. On 20 May 1935, he visited the marshes again, but did not see

any cranes (WCSR, 1935, C.S. Van Tuyll).

28. In a letter to Dewey Soper, 19 January 1948, D.H. Rendick of Lacombe, Alberta, reported "we actually saw 1 pair nesting and another pair at the far end of the lake from their actions we could gather that they were already hatched and were hiding their young." This observation, from either 1933 or 1934, was at a small lake near Old Wives Lake.

Summer Records

29, 30. "This beautiful bird is common in the Qu'Appelle Valley and in the Touchwood Hill range."¹⁸ Hind explored southern Saskatchewan in 1858. He saw the first Whooping Cranes on 14 July at "Weed Ridge," probably about 5 mi. east-southeast of present Grenfell (Dr. C.S. Houston, pers. comm.). On 21 July, on the marshes upstream from Pasquia Lake he noted the "white crane" in flocks of four and seven.

31. On 12 or 13 August 1872, Frank Fleming and John Macoun saw two white cranes on a ridge on the prairie south of Quill Lake. Frank Fleming and Willie, an assistant, chased the cranes along the ridge on horseback. "One of the cranes took to flight and the other one, which may have been a young one and unable to fly, ran like a race horse. Willie went after it and eventually ran up close enough to throw his lariat around its head and brought it to the ground. The old one returned and seemed to attack Willie but was beaten off by Frank Fleming."²⁶

Grant reports this story with a few differences.¹⁶ He reports that Willie killed the crane with a stone. The cranes were reported to rise from a wet marsh near the road, not a ridge.

Grant refers to the one killed as a young one. Extended wings measured more than 6 ft. from tip to tip. The crane was eaten at camp that night and reported to be very good.

The fact the crane was flightless could indicate a young bird and so indicate nesting nearby. Grant refers to it as a young bird and Macoun says it may have been a young one. However, neither Grant nor Macoun mention the rusty tinge a young Whooping Crane would have in mid-August, in fact both describe two white cranes. Adults do experience a flightless period while moulting, so flightlessness does not necessarily mean a young bird. By August 13 both adults and young should be able to fly, hence this may have been an injured adult.

Macoun and Fleming crossed the prairie between Kutawagan Lake and Big Quill Lake on 13 August. However, Grant places the incident on 12 August, when they were still south of the Touchwood Hills, about 12 mi. west of the present site of Ituna.¹⁶

32. S.J. Taylor of Regina indicated that Whooping Cranes were quite common in the Yellowgrass Marsh from 1898 to 1905 but had no reason to believe they had been seen there during the subsequent 20 years (i.e., between about 1910 and 1930).⁹ I expect Taylor refers to cranes being common in summer, but it is possible he meant common as migrants.

33. Raine quotes MacDonald as sighting a single Whooping Crane flying toward Rush Lake on 13 June 1891.³⁴

34. R.M. Barnes of Lacon, Illinois, observed a Whooping Crane at Big Quill Lake in 1909. His report is

quoted by Ferry as follows: "June 14 we saw a splendid specimen of this species standing on the wide muddy flat at the north end of Big Quill Lake. We examined it carefully with our glasses, and endeavoured to stalk it. This was the only specimen seen."¹¹

35. R. Grieve of Yarbo reported "There were two I used to see when I was ploughing that led me to believe they nested somewhere close. This was near 1 large marsh southwest of the town of Rokeby. They used to go through some very funny antics on a small knoll in a hay meadow. These dances would go on early in the morning and late evening."⁹ The report is indicated as 25 to 30 years ago which probably indicates between 1900 and 1910. It could be a spring migration observation, but Yarbo's report indicates repeat observations, and he suspects they may have been nesting. I thus conclude this is probably a summer record.

36. Two Whooping Cranes at 27-29-11-W2, 2 mi. east and 7 mi. south of Foam Lake, through the summer of 1910, but were not seen there in subsequent years. H. C. Grose of Lucky Lake.⁹

37. W. Huber of Unity found a Whooping Crane which had been shot at Muddy Lake (Tp. 38-22-W3) on 27 April 1921. The mate of the dead whooper remained in the area for several months.⁹

38. Seven Whooping Cranes, flying over Ladder Lake near Big River. 10 August 1927. Mr. G.H. Cartwright.⁹

39. Robert Perrin of Maple Creek reported seeing "a few" in early August, apparently of 1928 or 1929, east of Big Stick Lake.⁹

40. An adult, sex not recorded, was collected at Vonda on 13 June 1930 and held at the Saskatchewan Museum of Natural History, then sent to the Museum of British Columbia (Dr. Paul James, pers. comm.).

41. Two Whooping Cranes circling over Emma Lake. Summer, 1932. John N. Hackett of Christopher Lake.⁹

42. One Whooping Crane feeding on stubble near the Beaver River, August 1936 and one flying near the Beaver River (5-62-21-W3), July 1945. George Bauman of Golden Ridge (WCSR, 1945, Mr. George Bauman).

43. In summer of 1937 and 1938 three and five Whooping Cranes were seen by Mrs. L. J. Bayet of Hudson Bay. The cranes spent the summer on a field gone back to voluntary sweet clover located 8 mi. southeast of Hudson Bay on 2-44-3-W2. There was a marsh not far away. Bayet reports they are quite unafraid of men (WCSR, 1945, L. J. Bayet).

44. A Whooping Crane along the White Sand River at 21-30-3-W2, 3 mi. east and 2 mi. south of Canora. June 1945. Observed by students and reported by Pearl J. Achtemichuk of Canora, Sask. (WCSR, 1945, Pearl Achtemichuk).

45. Three Whooping Cranes. Seen almost daily from 29 April to 13 June 1945, in the vicinity of Campbell Lake 12 mi. west of Nipawin. J.M. Lyons, J.H. Wark and M.G. Street.^{21,39}

46. Ernest Johnson saw one Whooping Crane near Snowden during early June 1942. Garth Harrison observed one in the same area about

mid-June 1946 and Jack Carson had a pair near his home 4 mi. away all summer, 1946.³⁹ Walkinshaw searched this area by air and foot in 1947, but located no whoopers.

47. One Whooping Crane. Flushed from reeds in a marsh at the north end of Christopher Lake. Mid-July 1945. W.D. Roberts (Whooping Crane Investigation Form, 1945, by W.D. Roberts, Prince Albert, SMNH).

48. One Whooping Crane. Near Stockholm. June 1947. Mrs. E. Meadows.¹

49. One Whooping Crane. Near Invermay. Late May or early June 1948. M.S. Dimmick.¹

50. One whooper on the shore of Dore Lake (13-66-9-W3). 1 and 2 June 1954. Observed by George Roberts, a DNR towerman, who was confident this was not a swan or a pelican (Letter B.H. Matheson, District Supervisor, Department of Natural resources, to Bard, 14 June 1954).

51. One yearling Whooping Crane at 10-12-23-W2, 2.5 mi. south of Avonlea. 23 and 24 June 1954. Photographed by Fred Lahrman of the SMNH (WCSR 1957 by F.W. Lahrman).

52. One Whooping Crane at 10-18-23-W2, 9 mi. south and 1 west of Disley. 24 June 1954. G. Schmidt (WCSR 24 June 1957 by Rex Gary Schmidt).

53. One Whooping Crane on W7-27-23-W2 near the east shore of Last Mountain Lake, 11 mi. west of Govan. 24 August 1954. R. Blackwood (Whooping Crane Sightings in Saskatchewan 1954-58, 7 pp. file in SMNH).

54. Two adult Whooping Cranes near Haultain, June 1956. Bill Hyska (Letter Brian Johns to DGH, 19 Dec, 1988). Photographed by Bard 25 June 1956.²

55. Bard reported two Whooping Cranes photographed at Alsask in April 1956 by Gordon Duane and indicates he photographed two birds here for the museum.² No date is given but he refers to this as a summer record.

56. One yearling whooper on 10-18-23-W2, 2 mi. north and 3 mi. east of Stony Beach, 23 and 24 June 1957. Rex Gary Schmidt & Fred Lahrman (WCSR, 1957, Fred Lahrman; WCSR, 1957, Rex Gary Schmidt).

57. One Whooping Crane at Simpson, 6, 27 and 30 May and 24 and 28 August 1958, and presumably present all summer (Bard 1959).

58. One adult Whooping Crane at Imperial Beach, Last Mountain Lake. 22 June 1964. Margaret Belcher, S. R. Belcher and C. S. Houston (C. S. Houston, pers. comm.).

59. Two Whooping Cranes on E12-14-01-W3 on the shore of Old Wives Lake directly south of Old Wives village. 22 July 1969. Dick Yancey, confirmed by RCMP (Brian Johns to DGH, 19 December 1988).

60. One Whooping Crane feeding in a wheat field within 150 yards of tractor on E17-18-27-W2, 4 mi. west and 3 mi. south of Tuxford. 3 August 1976. Eldon Beasley (Brian Johns to DGH, 19 December 1988).

61. One whooper at slough on section 9-31-26-W2, 4 mi. west of Renown. 7 July 1977. A. Hansen, US Fish and Wildlife Service³⁸ (Brian Johns to DGH, 19 December 1988).

62. Two adult whoopers on 33-43-01-W3, 3 mi. north of Batoche. 7 to 20 August 1977. Mrs. B. Berg and Conservation Officer R. Brunt³⁸ (Brian Johns to DGH, 19 December 1988).

63. Two Whooping Cranes on a wooded island in the North Saskatchewan River, 11 mi. north of the Petrofka Bridge. 11 August 1977. K. Steuart³⁸ (Brian Johns to DGH, 19 December 1988).

64. One whooper near Little Quill Lake at a Ducks Unlimited project on Milligan Creek, Township 33-14-W2. 30 May to 31 August 1981. Many observers³⁸ (Brian Johns to DGH, 19 December 1988).

65. One Whooping Crane on SW21-59-19-W3, 12 mi. west of Meadow Lake. 24 July to 1 August 1988. Y. and L. Cockrum. While this sighting was not confirmed it may have been the same bird as the next record (Brian Johns to DGH, 6 January 1993).

66. One adult whooper with 10 Sandhill Cranes. Flat Lake (2 mi. S of Wilkie) 24 August 1988. R.H. Kerbes and Gary Wobeser (locals reported bird present since August 3) (Brian Johns to DGH, 19 December 1988).

67. Two yearling Whooping Cranes, identifiable by leg bands, spent the summer of 1989 in Saskatchewan, moving several times from the Cudworth area (28-31 May) to Speers (5-22 June) to Radisson Lake (4 July) and back to Cudworth (10 July to 24 October) (Brian Johns to DGH, 6 January 1993).

68. Two yearling whoopers on Eyebrow Lake 15 May to 11 September 1989. Usually found near the

upstream end of this marsh. One unbanded adult, assumed to be one of the two which had summered there in 1989, spent 30 May to 8 October 1990 at Eyebrow Lake (Brian Johns to DGH, 6 January 1993).

69. One yearling whooper, banded green-white-green on left leg, green on right. NE19-18-18-W3, 3 mi. south of Cabri, 15 May to 10 September 1989 (Brian Johns to DGH, 6 January 1993).

70. One yearling whooper on Surprise Lake, SE01-21-7-W2. 17 May to 3 August 1990 (Brian Johns to DGH, 6 January 1993).

71. One whooper on 7-32-23-W2, 10 mi. NE of Watrous. 13 August to 15 September 1990 (Brian Johns to DGH, 6 January 1993).

72. One Whooping Crane on SW14-20-28-W2, 3 mi. west and 5 mi. north of Marquis. 12 to 25 August 1991 (Brian Johns to DGH, 6 January 1993).

73. One whooper on Bullrush Lake, 11-28-25-W2, near Imperial, 29 July 1992. Relocated north end of Last Mountain Lake 17 August until 25 September (Brian Johns to DGH, 6 January 1993).

Discussion The Whooping Crane appears to have been a widespread, although probably not abundant, nesting species in Saskatchewan. Twenty-nine known and suspected breeding records are spread from the southern mixed forest to the short grass prairie as mapped by Richards and Fung.³⁶ The greatest number of sites, 13, are in the aspen parkland. Three are north of the parkland in the southern parts of the mixed forest and one, Richardson's report, may indicate breeding in the

forest, parklands, or both. Eight of the records come from the mid-grass prairie, and four from the short grass prairie as mapped by Richards and Fung.³⁶ Other authorities place the short grass border further south. For example, following the maps in the prairie Conservation Action Plan would place these four in the mixed grass prairie. This distribution generally agrees with Allen's conclusion that the aspen parkland and adjacent transition areas were the major breeding areas. However the breeding range extended further north, to include suitable marshes in the southern part of the forest, and further south to include more marshes of the grasslands than shown by Allen's range map.¹

Within what is now agricultural Saskatchewan, Whooping Cranes appear to have nested wherever suitable, large, shallow marsh areas were found. The report of 12 Whooping Cranes nesting at Shallow Lake in one year suggests that the large marshes of the grassland were excellent breeding habitats, at least until the 1930s drought. Nest records from areas like Wauchope suggest that smaller wetlands were also used.

Nest sites are sometimes described as prairie, more often as a marshy meadow or shallow marsh. Several nests were on top of muskrat houses. A consistent feature of nest sites seems to be shallow water with emergents from which a nesting platform can be built. Most areas appear to include a significant shallow water area where cranes foraged.

The scattering of breeding sites across the province suggests that many other shallow wetlands were also used. Estimating the total population is difficult not only due to the

paucity of data, but because the species was declining in numbers by 1870, before European settlement of Saskatchewan and prior to all records cited here except Richardson's.¹ The lack of breeding records from the northwest part of the agricultural zone may be a reflection of later settlement of this area rather than unsuitability of the habitat.

Suitable wetlands in Saskatchewan were once much more extensive than at present. A pre-settlement Saskatchewan population of at least 200 and, perhaps, more than 1000 pairs seems reasonable, unless many habitats were unoccupied due to limitations of winter habitats.

The former wide distribution of the Whooping Crane in southern Saskatchewan suggests that almost any marsh complex offering extensive areas of emergent vegetation suitable for nest building and shallow areas for foraging could support Whooping Cranes. If a reintroduction is considered, selection of the actual site should consider current habitat quality and security, isolation, area for possible population expansion, access for wildlife management staff, sandhill crane populations, crop damage and hunting, as well as political and economic factors. The reports from Kiyiu, Shallow and Luck Lakes all mention the lakes drying out in the 1930s drought. Thus the drought may have dealt a last blow to these southern populations. Water supply must be a consideration when selecting a release site.

One area which could be investigated is the Yorkton wetlands complex south of Yorkton. There are several nest records from this region, most of this large wetland complex is controlled by Ducks Unlimited and

the wetlands are mostly surrounded by pastureland and so quite isolated, even though a city is only a few miles to the north. The extensive marshes of the Cumberland Delta offer a second possible release area. Although there are no confirmed breeding records from this area, there is a possible record from Red Earth and Richardson's comment that they frequent every part of the fur countries suggests they were found in the Saskatchewan River Delta, a key part of the fur country.

The Quill Lakes-Last Mountain Lake area would appear to be attractive in most respects, but Sandhill Crane hunting in this area and crop depredation by Sandhill Cranes argue strongly against reintroducing Whooping Cranes in this area. Further west Luck Lake is one of the most recently utilized sites and is now a managed Heritage Marsh with a secure water supply. The principal weakness to this site is the shortage of suitable adjacent wetlands for population expansion.

The population nesting in Saskatchewan in the early part of this century was a significant portion of the world total. Reported nesting populations for 1911 and 1912 total 20 cranes. Considering that sites such as Kiyiu Lake and Luck Lake which were reported later also probably supported cranes, suggests at least 30 Whooping Cranes in Saskatchewan in 1912. Winter counts at this time indicate a total population, including 32 Louisiana birds, of only 88.¹ Summer records from the 1930s and 1940s suggest that when the crane population reached its low of 15 in 1941, a few Whooping Cranes may have been summering in Saskatchewan, not Wood Buffalo. If so, the founders for the Wood Buffalo population may be more

restricted even than that low population suggests.

Acknowledgements I wish to acknowledge with deep appreciation the assistance and strong encouragement I received to complete this paper from Dr. C. Stuart Houston and the assistance in locating records provided by Ruby Apperly and Dr. Paul James, Saskatchewan Museum of Natural History, Brian Johns, Canadian Wildlife Service, and Dr. Ross D. James, Royal Ontario Museum.

1. ALLEN, R.P. 1952. The Whooping Crane. Research report #3 of the National Audubon Society. National Audubon Society, NY, NY.
2. BARD, F.G. 1956. Whooping Cranes in southern Saskatchewan in 1956. *The Blue Jay* 14:81.
3. ——— 1958. Whooping Cranes, 1958. *The Blue Jay* 16:11-14.
4. ——— 1959. Annual report of the Whooping Cranes in Saskatchewan, 1958. *The Blue Jay* 17:9-11.
5. BENT, A.C. 1926. Life histories of North American marsh birds. Smithsonian Institution United States National Museum Bull. 135. Dover Reprint Edition. Dover Publications, Inc. NY, NY.
6. BRADSHAW, Fred. 1923. Report of the Chief Game Guardian on matters relating to game protection, the administration of the Game Act, and the development of the provincial museum during year ended April 30, 1923. pp. 268-314 in Eighteenth annual report of the Department of Agriculture of the Province of Saskatchewan for the twelve months ended April 30, 1923. J. W. Reid, Kings Printer. Regina.
7. ——— 1930. Whooping Crane. Unpublished report. 3pp. SMNH files.
8. ——— 1956. The home of the Whooping Crane. *The Blue Jay* 14:76-8.
9. ——— Undated. Whooping Crane information (Saskatchewan). Unpublished list of reports received at the SMNH, unsigned by writer identifiable as Bradshaw by personal accounts, 15pp.
10. COOKE, W.W. 1914. Distribution and migration of North American rails and their allies. U.S. Department of Agriculture Bull. #128.
11. FERRY, J.F. 1910. Birds observed in Saskatchewan during the summer of 1909. *Auk* 27:185-204.
12. FINLEY, K.J. 1972. A 1921 photo of a Whooping Crane. *The Blue Jay* 30:151-152.
13. GILMOUR, Neil. 1923. Report of Neil Gilmour, Provincial Game Guardian. Pp. 290-293 in Eighteenth annual report of the Department of Agriculture of the Province of Saskatchewan for the twelve months ended April 30, 1923. J.W. Reid, Kings Printer. Regina.
14. ——— 1926. Report of Neil Gilmour, Provincial Game Guardian. Pp. 21-? in Bradshaw (1926) Report of the Game Commissioner on matters relating to game protection, the administration of the Game Act, and the development of the provincial museum during year ended April 30, 1926. J.W. Reid, King's Printer, Regina.
15. GODFREY, W.E. 1986. The birds Of Canada, revised edition. National Museums of Canada, Ottawa.
16. GRANT, G.M. 1873. Ocean to ocean — Sanford Fleming's expedition through Canada in 1872 — being a diary kept during a journey from the Atlantic to the Pacific with the expedition of the Engineer-in-Chief of the Canadian Pacific and Intercolonial Railways. John Campbell & Son, Toronto.
17. GRIFFITH, Brad, et al. 1989. Translocation as a species conservation tool: status and strategy. *Science* 245:477-80.
18. HIND, H.Y. 1860. Narrative of the Canadian Red River Exploring Expedition of 1857 and the Assiniboine and Saskatchewan Exploring Expedition of 1858. Vol. 1. Longman, Green, Longman and Roberts, London, England.
19. HOUSTON, C.S. 1972. Early Whooping Crane nest records near Yorkton, Saskatchewan. *The Blue Jay* 30:152-3.

20. — (Editor). 1984. Arctic ordeal: the journal of John Richardson, surgeon-naturalist with Franklin 1920-22. McGill-Queen's University Press, Kingston and Montreal.
21. HOUSTON, C.S. and M.G. Street. 1959. The birds of the Saskatchewan River, Carlton to Cumberland. Sask. Nat. Hist. Soc. Spec. Pub. #2, Regina, Sask.
22. JOHNS, B.W. 1987. Whooping Crane sightings in the Prairie Provinces, 1979-85. CWS Progress Notes #169.
23. LAHRMAN, F.W. 1972. The Whooping Crane in Saskatchewan. *The Blue Jay* 30:146-150.
24. MACOUN, John. 1881. Extract from a report of exploration by John Macoun, M.A., F.L.S. Report of the Department of the Interior for 1980, Sessional Papers #3, pp. 8-40.
25. — 1883. Manitoba and the Great North West: the field for investment. The home of the immigrant. Thomas C. Jack, Edinburgh & Glasgow.
26. MACOUN, John. 1979. Autobiography of John Macoun Canadian explorer and naturalist 1831-1920. 2nd ed. Ottawa Field-Naturalists Club Special Publication #1, Ottawa.
27. MACOUN, John and J.M. Macoun. 1909. Catalogue of Canadian birds. Canada Dept. of Mines, Geological Survey Branch, Ottawa.
28. MCCOY, J.J. 1966. The hunt for the Whooping Cranes: a natural history detective story. Lothrop, Lee & Shepard Co., Inc. N.Y., N.Y.
29. MITCHELL, H.H. 1924. Birds of Saskatchewan. *Can. Field-Naturalist* 38: 101-18.
30. MYER, DAVID, SILAS HEAD and DONALD MCKAY. 1974. Indian bird identification and Whooping Cranes at Red Earth, Saskatchewan. *The Blue Jay* 32:168-171.
31. PARKER, J.L. 1957. An attack on man by a Whooping Crane. *The Blue Jay* 15:63.
32. PEARSON, T.G. 1922. Whooping Cranes in Texas. *Auk* 30:412-3.
33. PITTMAN, H.H. 1956. Sandhill Cranes in retrospect. *Nature Magazine* 49(5):237-239.
34. RAINE, Walter. 1892. Bird-nesting in North-West Canada. Hunter, Rose and Co., Toronto, Canada.
35. REED, C.A. 1904. North American birds eggs. Doubleday, Page & Company. N.Y., N.Y.
36. RICHARDS, J.H., and K.I. FUNG 1969 Atlas of Saskatchewan. University of Saskatchewan, Saskatoon, SK.
37. ROY, J.F. 1964. An introduction to the birds of the Elbow. A list prepared for the annual summer meeting of the Saskatchewan Natural History Society, June 5-7, 1964.
38. STEPHEN, W.J.D. 1979. Whooping Crane sightings, Prairie Provinces 1977 and 1978. *The Blue Jay* 37:163-168.
39. WALKINSHAW, L.H. 1949. Apparent observations of the Whooping Crane in central Saskatchewan. *Can. Field-Naturalist* 63:78-80.



The average flowering date for the Crocus or Pasque-flower is 11 April at Winnipeg, 18 April at Saskatoon and 25 April at Edmonton. *R.C. Russell. 1962. Canada Plant Disease Survey* 42:162-166.

MIGRATION OF RADIO-MARKED WHOOPING CRANES FROM THE ARANSAS-WOOD BUFFALO POPULATION: PATTERNS OF HABITAT USE, BEHAVIOR, AND SURVIVAL

MARSHALL A. HOWE, 1989, U.S. Dept. Interior Fish & Wildlife Ser. Tech. Report 21. 33 pp.

AERIAL RADIO-TRACKING OF WHOOPING CRANES MIGRATING BETWEEN WOOD BUFFALO NATIONAL PARK AND ARANSAS NATIONAL WILDLIFE REFUGE, 1981-1984

E. KYUT, 1992. Canadian Wildlife Service. Occasional Paper 74. 50 pp.

The discovery of the Whooping Crane's breeding grounds in Wood Buffalo National Park in 1954, by a Canadian forester on fire-fighting duty, was an historic event, which triggered a recovery and monitoring program which continues to this date. Since then, diligent surveillance of the Whooping Crane has allowed a gradual population increase, along with ever-increasing knowledge of its life history.

The above-noted publications describe Whooping Crane migration routes from Wood Buffalo National Park (WBNP), Northwest Territories, to Aransas National Wildlife Refuge (ANWR) in Texas during the fall, and the return flight in spring. Both studies monitored radio-transmitted birds over a three-year period.

Both studies emphasize Whooping Crane departure from WBNP be-

tween mid-September (non-breeders) and mid-October (family groups). Birds travel alone, as family groups, or as small groups (three-five individuals) of unrelated individuals. In about two days they arrive in central Saskatchewan, and remain for several weeks, feeding on grain crops and roosting in wetlands. Once leaving Saskatchewan the flight to their winter range in ANWR is usually rapid (5 to 15 days). Whooping Cranes rely heavily on favourable northerly winds for the southward journey. In spring, birds depart ANWR on southerly winds between late March (breeders) and mid-April (usually non-breeders). During spring migration Kansas and Nebraska are heavily used states as stop-over sites, while in fall South Dakota, Oklahoma and Texas are heavily used. No specific wetland sites were chosen during migration, and stop-overs appear random, although Saskatchewan accounted for 43% of the crane-use days during fall migration. Wetland sites appear to be picked randomly in most cases, and may account for this bird being overlooked during migration.

All roost sites were associated with, or adjacent to, wetlands and devoid of vegetation, or with vegetation only along the margins. Feeding sites were wheat and barley stubble in Canada and wheat and milo stubble in the United States. Interactions with other species of birds were infrequent, although sometimes Sandhill Cranes foraged or migrated with Whooping Cranes. The maximum number of cranes observed together during migration was seven.

Both studies provide important

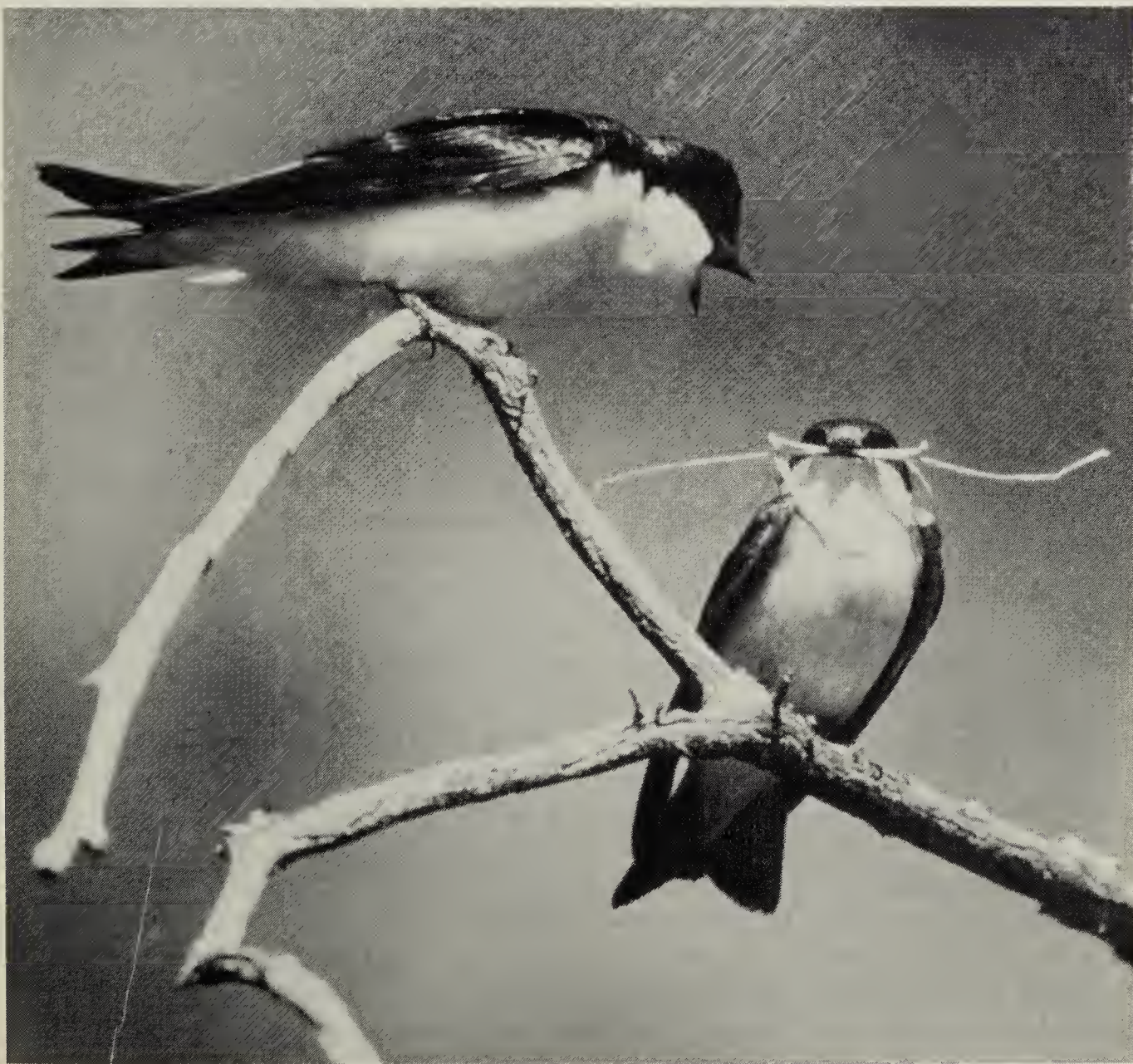
information on mortality of Whooping Cranes. Of some 12 deaths of radio-marked birds, six happened at WBNP before fledging, and occurred during two drought years, when wolves had easy access to many breeding territories. Golden Eagles are a potential predator of juvenile cranes, whereas Bald Eagles are not considered a threat. Both studies indicated that most serious losses of migrating Whooping Cranes were due to collisions with power lines.

Prior to the above studies, little was known about the ecology of migrating Whooping Cranes, including habitat use, flight pattern, behaviour and predation. Anyone interested in this magnificent bird, and the future

of this endangered species will welcome these two important studies. Every effort should be made to inform the general public that these birds are endangered and protected by federal, provincial and state laws.

Both publications can be obtained by writing (1) Publications Unit, U.S. Fish & Wildlife Service, 18th and C Street N.W., Mail Stop 1111, Arlington Square Building, Room 130, Washington, D. C. 20240, or (2) Publications Department, Canadian Wildlife Service, Environment Canada, Ottawa, Ontario, K1A 0H3.

Reviewed by *Harlan D. Walley*, Department of Biology, Northern Illinois University, DeKalb, Illinois. 60115



Tree Swallows

Wayne Lynch

BLUEBIRD RESCUE

RONALD A. BITTNER, Box 97, Abernethy, Saskatchewan. S0A 0A0

I received a phone call in the afternoon of 25 June 1992 from an employee of a local auction firm. He had a problem involving bluebirds, and wondered if I could help. A farm implement had been transported a distance of about 20 mi. to the auction yard. It had arrived two days previously and was to be sold about two days hence. The machine was placed in a large shed overnight and during this time someone heard birds chirping. An investigation led to the discovery of a nest of young bluebirds in the machine.

I was told on the phone that these birds could not have eaten for two days, and there was no sign of adult birds going to the nest when the implement was parked outdoors. It was clear that these birds were doomed without quick human intervention, so I agreed to try to help. I drove the six mi. out to the auction yard equipped with an ice cream pail and some rags for padding and cover.

I was met by the employee who had phoned and he led me to the machine with the nest. I think it was a baler, although I am not certain because my attention was focused on the birds. The nest was in a horizontal pipe which extended from the machine to the tractor hitch. It was about two feet from the ground. The entrance hole was in the bottom of the pipe and was large enough to al-

low us to reach into the pipe.

My friend reached in and brought out a fine young bluebird and placed it in the pail. It was fully feathered, and I estimated its age as about five days short of fledging. As the nest was at the end of his reach he had some difficulty retrieving the next three. Then I tested my reaching ability and brought out the last one. I covered the pail with a cloth and headed back to the car with the five young birds. On the way back to town there was much loud chirping. The pail seemed to amplify the sound and give it a three-dimensional quality such that the chirps seemed to come from various points in the car. I had difficulty believing that the birds were still in the pail, but my fears turned out to be groundless.

My plan was to place these young birds in one or more of my nestboxes which contained nestlings of about the same age. However, it was already late afternoon. Since the birds had not eaten for two days I thought it would be better to feed them and then place them in the boxes the next morning. The food menu that I offered contained only one item, mashed hard-boiled egg moistened slightly with water or vegetable oil.

I held the bird in one hand, holding its bill open with thumb and fore-

finger. With the other hand I poked a small wad of food far back into its mouth so that it would swallow. If the food was not placed far back the bird would shake its head and the food would end up on my face or elsewhere. I fed each bird once per hour for three hours. It was a messy job and obviously should be left to the parent birds if possible.

The next morning one of the birds was dead. In spite of this unfortunate setback, it was now time to find a new home for the remaining four. At the time there was a very limited choice of nestboxes with young birds of similar age. Most of my early broods had already fledged. I chose a box which had only one nestling. Initially there were five eggs in this box but some were broken or pecked by House Wrens leaving only one to hatch. The positive factor about using this box was that the parent would not be overworked feeding five nestlings. The negative point was that the original nestling was about seven days younger than the newcomers.

I expected some difficulty getting the four birds to accept their new home because they were so near to fledging age. I transferred them one at a time from the pail to the box. Before I had them all in the box, one had jumped out and dropped into the long grass under the box. I pounced on it and returned it to the box. By this time I had some doubt whether this bluebird rescue operation would be successful. Would the nestlings stay in the box? Would the parents

accept these new mouths to feed thereby increasing their workload considerably? Would the one young nestling be adversely affected by this exercise? However, I felt that I could do no more for them. I closed the box and quickly walked away, letting nature take its course.

Two days later I went on one of my regular nestbox monitoring trips. I opened the crucial box not knowing what to expect. What a pleasant surprise to see four healthy and contented bluebirds. I closed the box quickly and moved on because it is unwise to disturb birds that are near fledging. I did not see the fifth, younger nestling during my quick inspection. I wondered if it was getting any food competing with four larger siblings.

My next monitoring trip was a week later, and resulted in another pleasant surprise. The four older birds had fledged successfully. The original nestling looked healthy and contented. It had obviously received enough to eat for the previous nine days during which it had gained, and then lost, four nest mates. But would the adults continue to feed this lonely nestling for several days after the others had fledged?

Another week passed before the next monitoring trip. This time the box was empty. The last youngster had fledged successfully. This was a happy ending to the rescue operation. My bluebird fledge total for 1992 was 66 regular and 4 adopted.



EDITORIAL

How is *Blue Jay* doing? Is it reaching everyone it could reach? Do members of Nature Saskatchewan find it useful and interesting? These are questions that continually plague me as the editor. Since I began my stint editing *Blue Jay*, numerous people have written to me with their comments. Many of the letters I receive are very positive, saying that *Blue Jay* is interesting and that they read every issue cover to cover. Other letters feed my lingering doubts.

In 1991, Donald Hooper sent Mary Gilliland and the "Improvements to the *Blue Jay* Committee" a letter which said "some of our members are complaining that the *Blue Jay* has become too scientific and that they don't read it anymore." The numerous references attached to some articles turn off people who are just interested in the information or the observations, but the references help others who want to be able to find more information than what is written in *Blue Jay*. I have tried to strike a balance between scientific and non-scientific articles. This is why in any recent issue you will find both scientific articles, often written by professional biologists, and short write-ups of what a member saw in their backyard at the feeder, for example.

One of the biggest challenges is trying to get the "scientists" to write in an easy-to-read style, so that the information they provide will be read and absorbed by all *Blue Jay* subscribers. One long-time member wrote in to say "[*Blue Jay*] was a better magazine years ago in that the articles were not a bunch of figures

and all technical language."

Poetry is another contentious matter. Some love it; others hate it. It's impossible to edit. Who is to say what is good poetry and what is not? I think that poems add an extra dimension (perhaps a more spiritual one) to *Blue Jay*. For the time being poetry will remain.

Another suggestion for improving *Blue Jay* is to increase the actual physical size from 5.5 x 8.5 inches to 8.5 x 11 inches. The argument for this is that the detail in photographs would be improved and production may be cheaper.

One piece that may be missing from *Blue Jay* is a section for junior naturalists. There is no obvious source of material for such a section. Is this an important issue?

Other suggestions for improving *Blue Jay* are: to have more information about trends in conservation from other parts of Canada and the world; to pick an endangered species as a theme for particular issues; and to make book reviews very brief so that readers just get an idea of whether the book is worth reading rather than not having to see the book at all because all the good stuff is in the review.

Well, this brings me back to the original question — how is *Blue Jay* doing? I will continue to try to improve the journal and appreciate direction from concerned readers. Every little bit helps and will hopefully make *Blue Jay* a worthwhile journal for all Nature Saskatchewan members.

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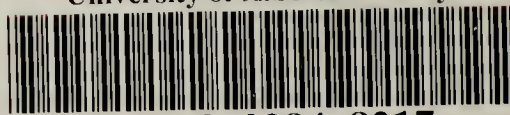


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